DESIGNING FOR DREAM SPACES:

EXPLORING DIGITALLY ENHANCED SPACE FOR CHILDREN'S ENGAGEMENT WITH MUSEUM OBJECTS

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Signature……..

Date……..

“BUILDING THAT BRIDGE BETWEEN VISITORS AND OBJECTS (…)

IS THE ESSENCE OF A GOOD MUSEUM DESIGN.”

JOHN H. FALK, 2009

ABSTRACT

This thesis presents an investigation into the potential of digitally enhanced exhibition spaces to foster the engagement of children within family groups with museum objects on display, i.e. where physical contact is prohibited. The main focus is on the influence of digital enhancement on visitors' engagement with artefacts and not on the digital elements themselves.

This study has taken the mixed methods approach. It combines ethnographically-informed field studies with a design intervention within an overarching methodology of action research. In the review of literature, research from multiple fields including museum studies, interaction design and play research was brought together and examined from the perspective of exhibition design. This led to the development of the Social Dream Spaces Model. This model, which describes how visitors engage with museum objects, was used as the basis for a design intervention aimed at enhancing children's engagement with exhibited artefacts. In-gallery participant observations were carried out in Bantock House Museum, Wolverhampton. Insights, based on data analysed from the perspective of the Social Dream Spaces Model, were used to develop a prototype of a digitally enhanced space, which was implemented into the existing exhibition. Data gathered in observations before and after the design intervention were compared in order to determine any changes in visitors' responses to the exhibition.

This study demonstrates the benefit of using the Social Dream Spaces Model for designing digitally enhanced exhibition spaces that promote children's engagement with artefacts and social contact around them. The findings also confirm that designing subtle and non-intrusive digital enhancement can facilitate intergenerational interaction in exhibition spaces.

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1 INTRODUCTION TO THE RESEARCH OF DIGITALLY ENHANCED EXHIBITION SPACES

This PhD presents an investigation into encouraging children's engagement with museum objects through exhibition design using digital enhancement. The focus lies in increasing the evocativeness of objects that are displayed behind glass, where tangible interaction is inhibited.

This study contributes to the field of exhibition design, which is in itself an interdisciplinary field integrating features from many disciplines, including applied arts, museum studies, psychology and architecture. The character of this research places it within the related fields of user experience and interaction design.

Research projects on the technological enhancement of museum exhibits have to date mainly concentrated on the production and testing of new devices and installations. In this thesis, however, digital technology is used as a means to enhance existing artefacts and not to create new exhibition elements. Previous research projects have tended to follow the subject-matter approach to the development of exhibits (Mastej *et al.* 2008; Scott 2000; Danks 2007; Kidd *et al.* 2011; Mannion 2012), where the focus is on the delivery of information content to visitors (Bitgood 1994, p.4). This study, in contrast, investigates visitors' engagement with museum objects. The stimulation of social interaction and engagement through enjoyment (the social facilitation and hedonistic approach to exhibit design) are here the focal point (Bitgood 1994, p.10). Unlike in other projects, museum objects are treated not only as illustrations of content presented, but as vital elements of a personal experience and centrepieces of social interaction.

1.1 CHILDREN'S EXPERIENCE OF MUSEUM SPACE - PROJECT 'REISELOGIE'

The idea of exploring digitally enhanced spaces in the museum context derived from my master's dissertation 'Child inclusive exhibition design - supplementing the needs of children in the conventional museum context' completed in 2009 at the University of Applied Sciences and Arts in Hildesheim, Germany. This work investigated design possibilities that facilitate children's independent exploration of an exhibition space. As an example, an additional children-orientated layer was developed for the exhibition 'Ancient Peru: Cultures in the Realm of the Incas' ('Alt Peru – Kulturen im Reich der Inka') at the Roemer- and Pelizaeus-Museum (RPM) Hildesheim, Germany. The project took the form of a knowledge expedition, based on an e-learning platform called 'Reiselogie'. After completing an introductory online game, children were encouraged to continue their journey in the museum. The exhibition area not only showed them artefacts, but also provided them with learning aids such as digital and non-digital interactive stations (Figure 1.1, p.18).

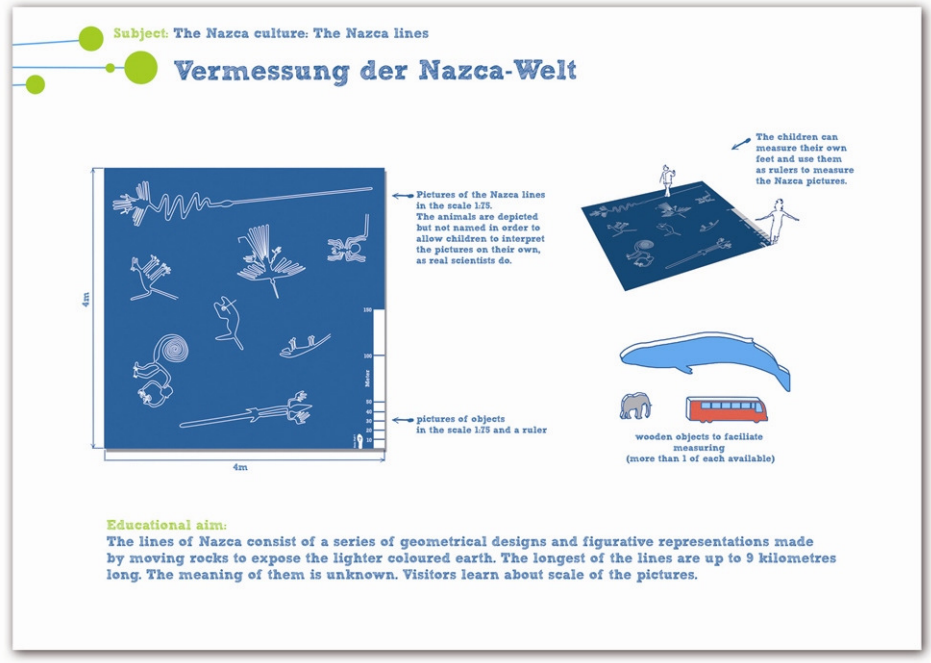

Figure 1.1. A sketch of a hands-on exhibit on the subject of the Nazca lines (Warpas 2009)

As part of the 'Reiselogie' project, through analysis and comparison of data gathered from literature, visits to museums and to child-centred institutions in Germany, children's

experiences in museums were investigated. Five key issues regarding the design of these experiences were formulated and became triggers for this current research. The five issues are as follows:

- Museum work is currently focused on knowledge transfer based on instruction and there is untapped potential to improve open-ended exploration.
- The presentation of artefacts can be improved to help child visitors better relate to these objects and connect them with their own everyday lives.
- Digital elements in a museum space can be improved so that they do not compete with museum objects.
- There is room for greater use of collaborative models of interaction as opposed to solo-user models which currently dominate.
- Digital elements can be used to encourage more cross-generational interaction in museums.

Through a preliminary assessment of exhibition practice in a number of museums, including the Victoria & Albert Museum in London (V&A), Birmingham Museum and Art Gallery, The Museum of London and The British Museum, it became apparent that these observations apply equally well in the UK. Although there are currently several research projects in Great Britain promoting innovative solutions in formal and informal education (e.g. Futurelab 2012, People's History Museum 2012, City University London 2012: Challenging History), these do not address the shortcomings of traditional exhibition practice.

For an exhibition designer interested in children as a target visitor group (cf. § 2.3, p.38), there is, however, one core subject emerging: the relationship between child visitor and museum artefact and how it can be encouraged through design. The findings outlined above suggest three strands of action:

- to use digital technology as a means to establish non-physical contact with objects in showcases,
- to facilitate engagement and open-ended exploration of an exhibition space through design,
- to encourage intergenerational communication around museum objects. This point is particularly relevant as children seldom visit museums alone.

These three goals were the starting point for this study.

1.2 RE-ESTABLISHING THE PERFORMANCE OF EXCHANGE

The following section outlines the historical development of exhibition design practice in the UK and discusses what influence this has had on the relationship between visitors and museum objects. The picture presented here may not depict each and every collection-based institution; rather, it represents a general trend that exists in exhibition practice.

The advent of museums in the UK dates from the middle of the eighteenth century (Bennett 2009, p.19). Before this time, artefacts from all around the world were gathered in private collections accessible only to the aristocracy, academics and merchants (Hooper-Greenhill 1992, p.190). The British Museum, founded in 1753 upon the collection of Sir Hans Sloane, became in 1759 the first national public museum in the world, i.e. entrance was given to 'all studious and curious Persons' and was free of charge (Trustees of the British Museum n.d.). It aimed to educate and shape the taste of the public (Hooper-Greenhill 1992, p.189). The style of exhibition, however, resembled that of cabinets of curiosities (Putnam 2009, p.8).

In the 1860s, as a result of pressure from the British government and the public for a more academic approach to object presentation, museums in Britain changed their policy of exhibiting artefacts. Objects were no longer gathered in one display as a collection of objects of wonder, but were separated from one another, labelled and put into

chronological order (Cummings & Lewandowska 2000, pp.41-45). The physical architecture of the museum was redesigned to facilitate understanding through a direct knowledge flow from an artefact through display to the visitor. Not all the results of this change in policy have been regarded as positive. According to Cummings and Lewandowska (2000, p.47), although informative,

> *the gap between this authoritative, fixed order and the extraordinary richness with which people interact with things opened a divide between visitor and artefact, as all the variety engendered by the performance of exchange disappeared. The Museum seemed cursed, by the convention of its exhibitionary practice, to exist in the present but to belong to the past.*

This 'performance of exchange' is an evocative idea. 'Exchange' refers to a process of giving and receiving, a two-way communication. The 'performance' of this communication implies elements of interaction, play, showmanship and imagination. The museum object had previously been put on show. This new mode of exhibiting, however, led to the loss of the 'performance of exchange'. It translated the museum's educational policy, predominantly based on instruction and explicit learning, into a physical architecture of vitrines and labels. On the one hand, this book-like structure underlined the place of each individual object in a greater, evolutionary, narrative whole but within this structure, artefacts were transformed from emotive objects, which evoked memory and imagination, into representations of rational knowledge (Cummings & Lewandowska 2000, pp.41-45). This approach ignores the irrational relationship that people often have with objects. According to Jordanova (2006, p.25), whether aware of it or not, visitors tend to "reify the objects they examine, treating them as decontextualised commodities, and identify with them, allowing them to generate memories, associations, fantasies". Objects evoke memories: those directly connected with their history, and indirect memories, which come from people who are reminded about the past by engaging with them (Kavanagh 2000, p.4; Slotte 2007: Gone Fishing, Boat Scene I; Veiteberg 2010, p.150). These two processes: knowledge gain and evocation of recollections are

connected and constitute a combination that allows the understanding of an exhibition. Museums continue to concentrate on the transfer of knowledge rather than on the creation of a space for visitors' personal interpretation.

In the 1980s, due to changes in the funding policy that forced British museums to develop new strategies that would attract greater audiences and more sponsors, a move was made to enable more active participation of visitors. The era of 'blockbuster' exhibitions had begun. As a result of commercialisation, museums became increasingly focused on entertaining rather than educating. Consequently, exhibit design was used to produce more and more "'interactive' push-button technologies" (Cummings & Lewandowska 2000, p.116) as a way of engaging visitors in a seemingly more active way. As a result, quality made way to quantity i.e. museum work was judged in terms of increasing the numbers of visitors, services and education initiatives instead of what these visitors gained from a visit. In spite of this change in focus, the authoritative and directed mode of knowledge transfer remained. Museums, entrenched in the conservative role of directing their exhibitions, retained an 'elitist culture' cultivated by academics (Konheim Kramer 1994, pp.155-160; Cummings & Lewandowska 2000, p.177). In the re-opened discussion on public access to museums of the 1990s, the need for solutions that enabled a wider audience to engage with the interpretation of the exhibited collection was expressed (McPherson 2006, p.46). As Cummings and Lewandowska (2000, pp.181-182) state,

> *the challenge for the Museum remains for it to try to 'reanimate' its objects, to encourage its public to engage with the active reconstruction of the past in the present. Perhaps it would mean dropping the reliance on 'evidence' - the information emanating from the academic heart of the Museum - and, instead, making a commitment to discussion with a broad range of interest groups as means of bringing museum artefacts into the realm of playful possibility enjoyed by things in contemporary exchange.*

In this context, 'to reanimate objects' does not mean to attract visitors' attention by implementing the latest technologies into the exhibition, but to use all means available to facilitate visitors' engagement with artefacts.

Exhibition design offers the means to create a space of engagement where not only is knowledge acquisition enabled but the 'performance of exchange' between the visitor and the object is re-established. The focus of this study is the use of digital technology, which, while it has shown potential for engaging child visitors with exhibitions (Dansk 2007: The Interactive Storytelling Exhibition Project; the V&A 2009: Web Quests Website), has to date been used mostly as a means of knowledge transfer. Digital technology has also been used in the creation of standalone exhibits that entertain visitors in the exhibition space, rather than enable them to engage with objects on display (Kidd *et al.* 2011).

1.3 DESIGN PERSPECTIVE

Museum practitioners and designers, often talk about 'learning' in the context of exhibit development, in particular what learning experience they want the visitors, especially younger ones, to have (Hindmarsh *et al.* 200;, Mastej *et al.* 2008; Science Museum 2009). They make the assumption that any change in visitor behaviour is indicative of a learning process. To them, enabling knowledge acquisition and enquiry of facts is a main design focus. As a result, new exhibition elements and display spaces are designed from a cognitive perspective. The experience of a museum visit is, however, much broader and more complex (Korn 1992, pp.169-172; Falk & Dierking, 1992, p.175; Jordanova 2006, p.22). As exhibition designer and evaluator Randi Korn (1992, p.169) noted "learning is not the only justifiable outcome". Learning as an outcome of exhibition design is not the focus of this thesis, neither as a goal, nor as a design perspective. In order to explore new approaches for exhibition design, other views on the visitor's museum experience and therefore on the design process have been investigated. The focus of this research is built around five aspects of the design of children's museum experiences: open-ended exploration, object-centred interaction, intergenerational communication, collaborative

models of interaction and personal connection with objects (cf. § 1.1). The initiation of engagement with museum artefacts, which may or may not lead to learning, is therefore the main design perspective in this thesis.

1.4 THE RESEARCH QUESTION AND METHODOLOGICAL APPROACH

The aims of this study were to examine how digital technologies can be employed to enhance children's engagement with conventionally exhibited artefacts and to investigate what design models can be used to aid this task. To this end this research project asks the following question: *How can the digital enhancement of a conventional exhibition space foster the engagement of children within family groups with objects on display?*

The focal point of this research is, therefore, engagement of child visitors with museum objects displayed in the conventional way (Dudley 2010, p.4; Simon 2010, §4), i.e. in glass cabinets where physical contact is inhibited. Throughout this study the term engagement refers to visitors' personal responses to artefacts, which may be emotional, physical or sensory (Hughes 2010, p.34; Jordanova 2006, p.23; Korn 1992, p.170; Annis 1986, p.169). The age group in the focus of this research is that of primary school children from 7 to 9 years of age, who are already able to actively participate and understand the subjects presented. Children of this age group very rarely visit exhibitions unaccompanied (Haas 2007, p.49). Rather, they come as members of a family or school group. School groups tend to visit museums as participants in special events or for organised activities. This study focuses on children in the context of a family (a visitor group consisting of at least one child and at least one adult relative), for whom the museum visit is a leisure time activity. In this study, digital enhancement is regarded as a tool to mediate non-physical contact between visitors and objects (Dernie 2006, p.77; Hughes 2010, p.18). The subject of this thesis is, therefore, not the technology itself, but the way it is used to initiate children's engagement with artefacts. Here, objects which are enhanced through digital technology are regarded as 'digitally enhanced objects'. The term 'digitally enhanced

spaces' refers to both spaces that contain digitally enhanced objects and spaces which are themselves digitally enhanced.

To answer the research question, this study combines theoretical investigation with design practice. First of all, in the literature review, the characteristics and connections between the following elements are examined in order to define the context and the key concepts of the research: the child visitor, museum artefacts and digital technology within conventional exhibition practice. As the aim of this study is to foster children's engagement with artefacts, existing models of visitor-object engagement are discussed and ways of using digital enhancement to initiate engagement in exhibition spaces are investigated, supported by analysis of examples from current design practice. On this basis a new model of engagement is created: one that concentrates on personal responses of visitors to objects on display. This model serves as a theoretical framework for further investigation.

The empirical part of this thesis was carried out to test the usefulness of the new model in designing digital enhancement of objects in showcases. In this thesis, a mix of methods (Creswell & Plano Clark 2011, pp.71-72) was adopted which combined theoretical enquiry with a design intervention. Techniques drawn from design ethnography (Denscombe 2010, pp.80-81; Clark & Moss 2011, p.3), which were used to gather the main qualitative information, also allowed some quantitative data to be collected. Making in-gallery observations of participants was the key method to gather comparable data before and after design intervention. The research strategy was modelled on the action research approach (O'Brien 2001), which is a holistic, reflective strategy used to find solutions in problem-driven projects (cf. § 3.3.1, p.72). Initially, observations were conducted in order to determine visitors' responses to the exhibition space before any design intervention (cf. § 4, p.89). According to the analysis of data gathered, design goals were formulated and a prototype of a digitally enhanced space was developed and implemented into the existing exhibition (cf. § 5, p.127). Final observations were carried

out, which aimed to determine any changes in visitors' responses and consequently the utility of the design model (cf. § 6, p.155). Bantock House Museum in Wolverhampton was chosen as a test environment for these explorations. Bantock House Museum is a local museum with a collection of objects from the Victorian era on display. The exhibition style represented is based on static and non-interactive exhibits. This provided an opportunity for digital enhancement.

1.5 ETHICAL IMPLICATIONS

As this research involved human subjects directly (interviews, observations) and the results of their work (drawings, photographs, texts), ethical approval was required. In October 2009, the research was submitted to the School Research Committee for ethical approval and accepted. The CRB check was carried out by Bantock House Museum in order to allow the researcher to work with child visitors on site. Where necessary, such as for the recording of interviews, written permissions were obtained from all participants. All data gathered were coded and presented in the main body of work as well as in the appendix in a manner that protects the identity of participants.

1.6 THE STRUCTURE OF THE THESIS

This thesis is divided into seven chapters. Following the introduction (chapter 1), a review of literature (chapter 2) outlines the main focal points of this study, including: engagement, museum artefact and child visitor. It presents a selection of examples of digitally enhanced spaces through which criteria for further practice were formulated and which led to the identification of the research gap. Finally, a new design model is devised, which is used in the design phase of the work. Chapter 3 introduces the mixed methods approach and presents a review of methods and tools applied in data collection and analysis. Chapters 4, 5 and 6 deal with the empirical part of this PhD and include: analysis of the initial in-gallery observations before any design intervention, the concept and implementation of the prototype of digital enhancement and comparative analysis of data

gathered in observations. Chapter 7 assesses the outcomes of this research project, including the discussion of results against the theoretical framework and the recommendations for future research in the field. The appendix (chapter 8) contains data gathered during observations (e.g. interview transcripts, analysis spread sheets) and a DVD with documentation of prototype implementation, including a film and audio-visual materials.

As part of research development, papers on subjects related to this thesis were presented at conferences, including the 25th ICCP World Play Conference (Lisbon, Portugal 2010), International Conference 'Re-Thinking Technology in Museums: Emerging Experiences' (Limerick, Ireland 2011) and International Workshop 'Creative Design for Interdisciplinary Projects in Cultural Heritage' (Innsbruck, Austria 2012). Some of the papers presented have been published in the conference proceedings and are included in the bibliography (Warpas 2011, Warpas 2012).

2 LITERATURE REVIEW

This chapter outlines the context of the research, focusing on the engagement of child visitors with museum artefacts mediated through digital technology. This review is used to develop a new design model for social engagement with and around artefacts. Since this project concentrates on conventional exhibition practice in the museum context, the discussion begins with an outline of the current status of collection-based museums.

2.1 CONVENTIONAL EXHIBITION PRACTICE IN THE MUSEUM

The International Council of Museums' (ICOM) most recent definition of 'museum', which was agreed upon in Vienna in 2007, describes a museum as

> *a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment (ICOM Website 2007).*

Its main mission, therefore, is to collect, conserve, research, interpret and exhibit. According to Noble (cited in Bradburne 2004, p.75), these tasks "are like the five fingers of a hand, each independent, but united for a common purpose". Interpretation and exhibition are often put together as a means of presenting the work of the other three tasks. This research is centred on exhibition practice of museums, whose core is the collection of tangible objects, which are often unique, and that form the focus of its activities. According to Pearce (2003, p.125), "collections are at the heart of a museum. In a fundamental sense, the possession of collections, of actual objects and specimens, is what distinguishes a museum from other kinds of institution." This has not changed since the eighteenth century, when the first museums, which were based upon previously privately held collections, were established. At the beginning, museums had only two primary functions: preservation and interpretation (Colbert 1961 cited in Hatton 2008, p.3). As in the case of Sloane's private collection, which later became the basis for the British Museum, the main aim was to create storage for objects worthy of preservation.

Additionally, museums interpreted those objects, through research and communicated their findings via exhibitions (Hatton 2008, p.3).

The role of museums changed with the opening of the Museum of Manufactures in 1852 (from 1899 known as the Victoria and Albert Museum), whose "founding principle was to make works of art available to all, to educate working people and to inspire British designers and manufacturers" (V&A 2012). With this goal the institution followed a Victorian ideal: "one of the cardinal principles of the mid-century; that public amusement should be combined with education. Pleasure with instruction was what the masses needed" (Steegman 1987, pp.230-231 cited in Hatton 2008, p.5). Accordingly the place of entertainment in the museum was seen as only being justified in conjunction with education. Museums started to be regarded as educational institutions in the service of society. It is from this origin that museums, as we know them today, emerged.

Even though views on the purpose of the museum have changed over time, the core has remained and defines its uniqueness: the collection of objects. These are presented to the audience mostly via exhibitions, which according to Hughes (2010, pp.18-19) are an efficient medium of communication. He states that,

> *anyone who wishes to gain a substantial understanding of a subject in a manageable time frame would be well advised to visit a well-curated exhibition, where the information they seek is mapped out as a comprehensible three-dimensional journey.*

One of the essential features of an exhibition, but also one that is most often taken for granted is its three-dimensional nature. Annis (1986, p.168) compares an exhibition to a theatre play, where curators set up a stage with motionless objects that create a narrative whole, approachable from different directions. Each visitor writes their own script by choosing their path and pace through this stage. The exhibition with its three-dimensional space and physical objects allows a unique kinaesthetic experience, "during which our movement seems to change the space and the place somehow changes us" (Dexter Lord

2007, p.7). The visitor is challenged and given the opportunity to discover and examine artefacts from a non-two-dimensional point of view.

Gurian (2007, p.27) affirms that "it is the physicality of realia that makes museums special". The focus on the object becomes an advantage of the museum as it allows personal, visual and sometimes even tangible contact with unique physical items. For example, although today it is possible to view almost any item on the screen of a computer, digital reproduction is not able to imitate a real object in all its features, especially texture and scale, which are inimitable and experienceable only through contact with physical objects. The most common way of presenting artefacts to the public is to display them in showcases for viewing. This practice, in this study referred to as conventional exhibition practice, introduces several challenges for exhibition design that will be addressed throughout this research. One key issue is that contact with objects displayed behind glass is impaired. A growing number of museums have introduced other solutions into their exhibitions in order to "enhance the learning experience and to complement the display of real objects" (Darnie 2006, p.74). In the quest to find ways of communicating with their audience, museums incorporate audio guides, touchable replicas, hands-on exhibits, computer interactives, touch tables, multimedia installations, simulated environments, reconstructions and even experiences of virtual reality, in the hope that these will "link the visitor experience with the collection displayed and initiate a communication between the visitor and the object" (Waltl 2006, p.5). In practice however, these additional elements are not designed as enhancements of the objects themselves but rather as independent artefacts (Holdgaard & Ekelund Simonsen 2011, p.114). Additionally, research in this area has tended to focus on visitors' engagement with additional elements themselves (Hornecker & Stifter 2006; Heath & Lehn 2009; Kidd *et al.* 2011) and not on how these installations effect visitors' engagement with objects on display. The challenge for designers of exhibitions is to incorporate digital elements into exhibition spaces in a way that encourages visitors to engage with the artefacts exhibited.

Engagement is an important word in the vocabulary of museum practice and exhibition design. According to Hughes (2010, p.34),

> *it describes the process of addressing visitors directly, stimulating them, turning their attention towards something, creating lasting positive memories of a display and giving them new insights. Significantly, there is a real difference between showing exhibits to a visitor and engaging him or her with them. Engagement is much deeper and more profound experience that changes and deepens understanding and is the aim of good exhibition design.*

Hughes notes that presenting the objects is only a starting point which leads to triggered emotions, memories, fantasies and daydreams. As Waltl (2006, p.2) confirms, the key factor for potential visitors in choosing to visit a museum is not the quality of the collection, but the possibility to interact with it and the attractiveness of the exhibition as a whole. Creating opportunities for engagement with collections should, therefore, be a main concern of museum practitioners. This, however, is not always reflected in the theoretical models which describe the museum experience.

In the essentialist traditional museum model (Hein 2002, p.191, Dudley 2010, p.9), the museum's role is built upon preservation, documentation and exhibition of historical objects (Dudley 2010, p.4). Here artefacts are placed in an "object-information package" (cf. § 2.2, p.34), where the object is just one element of interconnecting information that the museum tries to transmit (Dudley 2010, p.3). Engagement with exhibits is based on instruction and explicit learning, initiated and mediated by the museum, which is viewed as a teacher, who actively presents knowledge to the visitors. Bradburne (2004, p.88) has noted that many hands-on exhibits in science centres and technology exhibitions resemble textbooks that explain scientific principles but do not demand any active participation. These exhibits come with an inbuilt 'right answer' which, "once discovered, exhausts the potential for further visitor interaction". The structure of a conventional exhibition resembles this book-like layout (Cummings & Lewandowska 2000, pp.41-45).

Figure 2.1 Fake object exercise (according to Bradburne 2004, p.93)

An alternative model is the socially inclusive or 'adaptive' model, in which the main role of museum is to serve society (Dudley 2010, p.4). According to this point of view, the visitor is seen as an active participant and the museum as a place to learn. A museum situation which facilitates open, indefinite learning enables various ways of exploration but does not determine what the learner will take from it. In other words, the focus lies on storytelling based on the visitor's own experience rather than on the intention of a curator (Hein 2002, p.190). In this context Bradburne (2004, pp.92-93) has introduced a principle where the museum allows visitors to make choices rather than merely being presented with information. As he states, "in abstract terms this means taking the visitor's competence and abilities seriously, and creating opportunities for the visitor to actively shape their experience in the museum". For instance, a showcase with a collection of objects and a label with factual information involves the visitor much less than the same showcase with a label 'One of these items is a fake' (Bradburne 2004, p.93), which confronts visitors with an implied task and drives them to examine the objects more carefully (Figure 2.1). In such an environment, it is not most important how many visitors will come but how often the presented activities will be used and repeated (Bradburne 2004, pp.92-93).

According to Dudley (2010, pp.3-4), however, both models above are information-centred and not engagement-centred. The museum object is a trigger for visitors' sensory

perceptions, which then influence emotions and cognitive associations. This dynamic interaction that combines meanings and physicality defines the materiality of objects (Pearce 1994a, p.25; Dudley 2010, pp.7-8). These characteristics of museum artefacts have, however, seldom been embraced by museum specialists in theory or practice. Dudley (2010, p.4), therefore, suggests the search for a third museum model which focuses on physical objects with a strong emphasis on their impact on people. Such a model would consider the neglected 'dream-like or magic aspect' of a museum, which 'is more than a place, but a network of relationships between objects and people' (Henning 2005, pp.11 & 99).

As shown above, conventional exhibition practice has to be reassessed in order to find more suitable design solutions. The following sections discuss the role of the artefact in the museum space and how the child-object relationship can be shaped and supported by means of exhibition design. This will allow conclusions to be drawn, which are necessary for the development of a new human-object engagement model as a theoretical base for further practical investigation.

2.2 THE MUSEUM OBJECT

In this section different forms and meanings of the museum object are presented in order to develop a perspective that enables re-establishment of the visitor-object relationship, such as existed in the era of cabinets of curiosities (Cummings & Lewandowska 2000, p.45; Henning 2006, pp.20-21) (cf. § 1.2, p.20). According to the museologist Zbynek Stransky (1970, p.35 cited in Maroevic & Edson 1998, p.178),

> *an object that lives in the reality of the museum is to be considered a document of the reality from which it has been taken. The museum object is at the same time a piece of heritage, that is, a real object whose form and material document the reality in which it originally appeared, in which it lived, and with which it has reached the present time.*

Although objects are inanimate physical things that exist in the present, museum objects refer back into the historical past (Cummings & Lewandowska 2000, p.41). These references are, however, not internal characteristics of artefacts, but reactions and connotations ascribed by humans (Kavanagh 2004, p.41). Dudley (2010, p.6) points out that every artefact is a complex fusion of features rather than a physical thing and that a museum object can take two forms. The first form is associated with the conventional approach to artefacts, which treats them as elements within a greater structure of data. These data are ascribed to artefacts through research and interpretation, mostly by curators. A museum object itself is thus hidden behind meanings that it represents and connotes. This in turn influences visitors and their perception of the museum space and artefact. Dudley (2010, p.4) suggests that this way of focusing on information juxtaposed with objects "immediately takes the museum visitor one step beyond the material, physical thing they see displayed before them, away from the emotional and other possibilities that may lie in their sensory interaction with it." This emphasis on information encourages not only the loss of the object as a material thing, but also promotes the view that "museums exist only to preserve, document and display objects" (Dudley 2010, p.3).

Today "the importance of museum learning is stressed in the context of the life-long and life-wide learning paradigm" (Hauser *et al.* 2009, pp.182-183), which implies a shift from a focus on instructional knowledge transfer on the part of the museum to a focus on dialogical, process-based meaning making on the part of visitors. In this new approach the second form of museum object is present. Here "the museum object consists of enmeshing of the physical thing and human, sensory perceptions of it" (Dudley 2010, p.6), i.e. visitor and object exist in complex relationship between physicality and the senses. This approach to the person-object engagements, which is followed in this research, is supported by other theories and ideas, such as the 'evocative objects' of Turkle (2007) and the 'social objects' of Simon (2010).

2.2.1 EVOCATIVE OBJECTS

Turkle (2007, p.5) states that while people are familiar with thinking of objects as useful or well-known, they are not used to considering them as "companions to their lives or as provocations to thought". Her idea of evocative objects connects these less familiar views and emphasises "the inseparability of thought and feeling in the relationship to things" (Turkle 2007, p.5). According to this theory, objects are centrepieces of lives, actions and experiences. They accompany our lives and trigger our thoughts. This idea was inspired by the work of the anthropologist Claude Lévi-Strauss and his interpretation of 'bricolage', which Turkle (2007, p.308) describes as "a style of working in which one manipulates a closed set of materials to develop new thoughts." Things, in this meaning, are 'goods-to-think-with' or triggers of concrete thinking that might lead to abstract thinking. According to Turkle (2007, pp.7-9), the evocative power of objects comes from different sources. They are part of us, like the soft toy of a child. They remind us of the past (the photograph of our first bicycle) or remind us of a particular moment in our lives (the birth band of our child). They allow us to go through times of transition (the old favourite blanket brought to a new house). They can also be evocative because of their unfamiliarity to anything we know. Whatever category an object is in, it brings thought and feelings together. Although museum artefacts have the potential to become a 'bricolage' set that influences visitors' thoughts and triggers the creation of new ideas, emotions and interactions, current conventional exhibition practice often suppresses their evocative qualities (Henning 2006, p.1; Simon 2010, § 4).

2.2.2 OBJECT-CENTRED SOCIALITY

Since this study not only looks at artefacts as triggers of emotions and actions of individuals, but also recognises the importance of social interaction in the museum it is necessary to consider evocative objects in a social context. Such an approach has been taken by Simon (2010, § 4) and is illustrated in her related concept: the social object.

In her book *'Participatory museum'*, Simon (2010, § 4) defines social objects as "engines of socially networked experiences, the content around which conversation happens. Social objects allow people to focus their attention on a third thing rather than on each other, making interpersonal engagement more comfortable". Social objects are evocative focal points of interpersonal interaction. Simon defines an 'object' as "a physical item that is accessible to visitors, either on display, shared through educational programming, or available for visitors to use" (Simon 2010, § 4). The theoretical basis for the idea of social objects lies in the theory of 'object-centred sociality' developed by sociologist Jyri Engeström. In his blog (Engeström 2005), he discusses the distinct role of an object (physical or virtual) in the creation of a social network, which has traditionally been understood as "a map of the relationships between individuals". Engeström proposes the addition of an object into the diagram of the social network, which in his understanding "consists of people who are connected by a shared object" (Engeström 2005). Although conceived for online communities, 'object-centred sociality' has been applied to the museum context, where objects play a significant role in building a relationship between viewers (Simon 2010, § 4). Simon further elaborates that "a social object is one that connects the people who create, own, use, critique, or consume it. Social objects are transactional, facilitating exchanges among those who encounter them." Most social objects are characterised by the following features (Simon 2010, § 4):

- They are personal: they evoke in the visitor a personal connection or a story to tell.
- They are active: they serve as a connecting element between individuals and trigger interaction or discussion between them.
- They are provocative: they are significant enough to become a distinct topic of discussion.
- They are relational: they are designed for interpersonal use. Often the cooperation of several people is necessary to make them work.

While not every artefact is social, many can be enhanced in several ways to gain sociability. This is a task which can be addressed through exhibition design: to create platforms that promote objects as centres of conversation (Simon 2010, § 4). The theories presented indicate that artefacts shape and influence people's experiences. They can not only be used as information carriers, but can also release sensory and cognitive associations (Dudley 2010), initiate trains of thought and feelings (Turkle 2007) and even go so far as to encourage interaction with other people (Simon 2010). The discussion above shows the conceptual potential of object-centred sociality as a way of engaging people with artefacts and encouraging them to share their responses to objects with others. This research investigates the realisation of this potential in practice.

2.3 THE CHILD AS A VISITOR

Children have their own particular relationship with objects.

> *[Objects] provide a means by which a child can represent or express his feelings, concerns, or preoccupying interests. (…) For the child an unfamiliar object tends to set up a chain of exploration, familiarization, and eventual understanding, an often-repeated sequence that will eventually lead to more mature conceptions of the properties (shape, texture, size) of the physical world (Garvey & Rubin 1977, p.41).*

Objects represent a mediating element between a child and their world. Children find it difficult, however, to relate to things which they cannot physically touch (Winnicott 2005, pp.51-52). For the design of exhibitions, especially those where objects are displayed behind glass, accessibility for children presents a challenge.

This situation has been observed in the museums of the past (Haas 2007, p.49). In the eighteenth century, children were not considered as a target group of museums as they lacked the level of education expected and their position in society was considered rather feeble (Haas 2007, p.49). If they happened to enter a museum at all, it was as non-paying escorts of their parents. The objects, situated on the height suitable to adults, were

difficult for children to observe. Labels, written in rather intricate language, did not facilitate understanding. An overwhelming number of 'Do not touch' signs and silence enforcers dampened children's natural curiosity. For many children, a museum visit meant having to endure hours of quietly looking at objects. Knowledgeable parents, familiar with the artwork or historic material displayed, were the only interpreters between objects and children (Haas 2007, p.49). This description often applies to conventional exhibitions even today. Although most contemporary institutions recognise the importance of addressing young visitors, children are seldom integrated as a target group into the conventional exhibition design (Gillian 1994, p.118). Responsibility for children is most often given to the education departments (Haas 2007, p.50), who prepare additional activities for them. Three common strategies are used to include children in conventional exhibition practice (Gillian 1994, p.118). The most frequently used approach is to the creation of edutainment trails, e.g. Family Art Fun! trails in the V&A permanent exhibition, which are worksheets that encourage visiting families to explore exhibitions through quizzes, drawing and observation games (V&A Website 2012c). The second method is to separate an area devoted to children ("ghettoisation"), where all activities for child visitors are contained. For instance, the Pattern Pod of the Science Museum in London, is a spatially secluded interactive gallery placed in the corner of the Wellcome Wing. It is aimed mainly at 5-8 year-olds, who are invited to learn about the term 'pattern' through various means (sounds, foam blocks, digital elements, colours, textures) (Science Museum 2009b). The Pattern Pod only remotely connects with artefacts displayed in the main exhibition area. The third strategy is to supplement the existing exhibition for adults with extra exhibits for children, e.g. hands-on exhibits in the V&A galleries (V&A 2012b). These are often standalone stations loosely connected with the content of the exhibition, mostly using replicas and models.

While written from the point of view of science centres the following comparison outlines the relationship between a child visitor and conventional exhibition:

> *Designers of science exhibitions stress how important it is for children to have fun when they visit them. Po-faced and overserious displays are likely to put young ones off visiting exhibitions for good. Dusty exhibits in sealed cabinets with no interactivity are anathema to children, and lead to boredom, which is the enemy of any good show. How often have you heard a child say, "That was really boring"? It takes only a few such experiences for children to be completely turned off by museum-based learning (Hughes 2010, p.47).*

Exhibition designers underline the importance of fun as a means of engaging child visitors with objects on display. The International Council of Museums agrees that a museum should offer the public the possibility to be active and to encourage the development of the interests of the people themselves (Vieregg 2006, p.16). To facilitate active participation among children, focusing on play is one of the most powerful and appealing methods.

2.3.1 CHILDREN'S ENGAGEMENT THROUGH PLAY

A child's view on play differs significantly from that of grownups. Adults tend to separate play from work (Rieber 1996, p.43, Strommen 2004, p.5, Koster 2005, p.10). In their understanding, play is a leisure activity that follows after the completion of some work (Rieber 1996, p.44). It is seen as a reward. For children, play is the same as work, i.e. children cannot make a distinction between these two activities (Gillian 1994, p.117). Small children in particular see every action as an opportunity to explore the surrounding world and to learn about them. Children live their lives through play (Shaffer & Kipp 2007, p.262).

> *The first thing to say about play is that it's not what you think it is. Or, to be exact, it's much more than you think it is (Kane 2006, p.10).*

To some extent, on the tacit level, we all know what play is. The ambiguous, unpredictable and flexible nature of play, however, makes it extremely difficult to define in concrete

terms. A brief look at research already carried out on play presents ample evidence on how much effort has been invested to find a suitable definition (Millar 1968, p.21; Fagen 1981 cited in Sutton-Smith 1997, p.2; Sutton-Smith 1997, p.221; Koster 2005, p.12; Kane 2006, p.10; Gordon 2006, p.1; Lester 2008, p.10). Play is generally defined as being characterised by three features:

- It is sociable.
- It is participant-driven.
- It is process-focused.

Firstly, play is socially constructed. It requires high levels of interaction between players and promotes collaboration between them. The sociability of play also involves spontaneity, enjoyment and pleasure. Secondly, play is user-driven, which means that it need not have an extrinsic driving force. Children play for their own satisfaction, to comfort curiosity or to experience new situations. Play is, therefore, intrinsically motivated (Garvey & Rubin 1977, p.41; Rieber 1996, p.44, Strommen 2004, p.2). Finally, play is about the process not about the product or outcome. It involves spontaneous experimentation, but is not concerned with any particular goal. Since children engage with the world around them through play (Shaffer & Kipp 2007, p.262; Brown 2008), any attempt to foster children's engagement with their environment should be done through means which are social, participant-driven and process-focussed.

These features are incorporated into child-orientated spaces, such as traditional playgrounds. There are three key terms that characterise playgrounds: sociability, open-endedness, and physicality (Seitinger 2006, p.16). 'Sociability' is one of the main features of play. It is, for this reason, advisable to design child-orientated spaces that support multiple users with all their differences and needs (Sturm *et al.* 2008, p.261). 'Open-endedness' of a child-orientated space ensures the creation of an environment where process-focussed and participant-driven activities are encouraged. 'Physicality' means engaging children into a physical activity. This is not only beneficial to the physical health

of the children but also improves the experience of self-directed play (Seitinger 2006, p.16).

There is little written on promoting play in the conventional exhibition context. Most available sources come from the fields of educational play and are written by psychologists and museum education specialists (Hein 2000; Lang *et al.* 2006; Falk 2007; Hooper-Greenhill 2007; Dexter Lord 2007). The majority of design literature derives from the field of architecture and focuses on the design of outdoor playgrounds (Rojals del Alamo 2004; Tai *et al.* 2006; Cañizares 2007; Broto 2011; Hendricks 2011; Galindo 2012). Nevertheless, in the last few years, a growing number of researchers (Cummings & Lewandowska 2000, pp.181-182; Hagebölling 2004, p.1; Eagle 2008, p.17) have been writing about the increasing need for play-based solutions in educational and non-educational settings as an essential mode of social and cognitive learning. In conventional exhibition practice, play, as a mode of engagement with objects, has not yet been sufficiently explored. Its social and interactive character, particularly in group activities, creates the opportunity to engage the audience in a more active way. Although the purpose of this research is neither to use play as a means of engagement nor to create a playground in a museum space, the main features of play and playgrounds are seen as closely connected to key issues regarding designing for children's interactive experiences in museums (cf. § 1.1.). In designing spaces with children in mind, qualities such as open-endedness, physicality and sociability have to be considered.

2.3.2 FAMILY AS A DESIGN CHALLENGE

The distinctive character of children as visitors lies not only in their abilities and needs, but also in the fact that they seldom visit a museum on their own. Instead, they come in groups, such as school classes or families. School or kindergarten groups are quite common in the museum landscape, especially where the collection presented extends material taught in the classroom. The importance of families as visitor groups should also

not be underestimated. Ellenbogen *et al.* (2007, p.17) describes a family in the museum as "a major audience and unique learning group of mixed ages and backgrounds bound together by a complex nature of family interactions". In these terms, the family is a most challenging visitor group. It consists of individuals belonging to diverse age groups with different backgrounds, different learning styles and various concentration spans. Moreover, individual families differ greatly from each other. Families challenge exhibition designers with requirements of accessibility, collaboration and conversation (Donnelly & Power 2007, p.27). Yet this challenge is seldom embraced in the conventional exhibition landscape (Borchert 2001, pp.118-119). As a cultural institution, a museum has the potential to connect members of the family and activate them into dialogue between different generations (Haas 2007, p.72). Children represent a connecting element between adults and the world of imagination and open-ended exploration. Adults, through formal education, have often lost or suppressed their ability to play and experiment (Koster 2005, pp.192-194; Robinson 2009, pp.9-17). Through interaction with other family members, children may lead them into more active participation. This in turn enriches the child's experience of a museum visit by facilitating a more personal connection to the subjects presented. Through supporting intergenerational exchange between individuals, not only are personal experiences enriched, but the collective perception is also shaped (Ellenbogen *et al.* 2007, p.25). Museums can help children and parents become better acquainted through common experience, conversation and interaction. According to Haas (2007, pp.62-71), such a cultural dialogue between visitors and the museum facilitates the involvement of the audience as subjects and gives them the opportunity to approach the exhibited content as individuals. Exhibition design has the potential to encourage such exchange by various means (Hughes 2010, p.47). One of these is through the incorporation of digital technologies into exhibitions (Kidd *et al.* 2011, pp.1-3). Eagle *et al.* (2008, p.38) have noted that what is missing in the design of digitally enhanced solutions "is an awareness of the importance of the more informal and intimate interactions between young children and others around shared physical

artefacts". Such solutions, therefore, clearly deserve further investigation and are addressed in this study.

2.4 DIGITAL ENHANCEMENT AS A MEANS TO ENGAGEMENT

Currently seen as a solution to the challenge of initiating engagement with exhibition spaces (Bradburne 2008, p.ix; Kidd *et al.* 2011, pp.4-7), the introduction of digital elements into exhibition spaces is the particular means of communicating with visitors that this section aims to explore. It begins with a short overview of the history of digital exhibition elements in the museum context.

In the 1960s, museums, particularly science and technology museums, were criticised for being old-fashioned, elitist, dull and irrelevant to technological progress and the visitors' lives (Hughes 2010, p.17). As a result a new type of learning institution, the so called 'hands-on' science centre, was established (Bradburne 2004, p.79). The first of nearly 1000 current centres worldwide was the Exploratorium, which was brought into existence in San Francisco in 1969 by Frank Oppenheimer, and later became a model for other science centres first in the USA and Canada, and later on in Europe and other countries (Bradburne 2004, p.79). The mission of these science centres was to make technology understandable for the layman through the usage of new media and other learning aids (Vieregg 2008, pp.259-260). There is still no recognised definition of a science centre. By and large, a science centre is an implementation of an exhibition concept which is based on the 'learning by doing' and hands-on principles. Technical and natural science phenomena are introduced to the visitors through a range of play stations where they can experiment independently and learn through corporal and sensual handling. Learning through experience and having fun at the same time better addresses the needs of 'kinaesthetic learners', traditionally poorly served by museums (Hughes 2010, p.17). Such exhibits, based on 'doing' rather than observing, have had an enormous impact on the further development of exhibition design. As Hughes (2010, p.17) states,

"'doing' is now the standard approach to the teaching of science and the interactive exhibit continues to infiltrate other areas of exhibition practice." 'Doing' often implies physical contact that, in a conventional exhibition, is inhibited. One of emerging alternatives has been the employment of digital technologies.

Figure 2.2. Homepage of the WebQuest Website (Victoria and Albert Museum 2010)

With the arrival of digital technology, museums have been given a vast variety of possibilities to engage visitors in a more active way (Hughes 2010, p.18). Digital technology is increasingly used to provide user-friendly online catalogues (Figure 2.2), educational stations and learning aids that supplement the information on show (Dernie 2006, p.74; V&A 2009: Web Quest; The Tate Gallery 2010: Tate Kids Website). Touch screens with knowledge quizzes or thorough descriptions of objects exhibited have become almost ubiquitous in the museum landscape. Simulated environments, virtual and augmented reality and reconstructions are increasingly common in the language of exhibition (Hegedüs 1997: Memory Theatre VR cited in Schwarz 1997, p.121; Sermon & Zapp 1999: The Body of Water; Dernie 2006, p.77). Although there is a growing emphasis on "using digital technology to enhance the learning experience and to complement the display of real objects" (Dernie 2006, p.74), the use of digital technology in exhibition spaces remains a design challenge. Digital elements, often used in exhibition spaces only

as add-ons, are designed in detachment to the objects on display (Heath & Lehn 2002; Dansk *et al.* 2007, p.105; Holdgaard & Ekelund Simonsen 2011, p.15). This research, in contrast, investigates designing exhibition spaces in which digital elements are treated as object-centred communication tools and are tailored for individual objects or sets of objects. The following sections present examples of the usage of digital technology to foster the engagement of users with enhanced spaces in and outside the museum setting. Finally, a comparative analysis of the overview is carried out and criteria for further practice drawn.

2.4.1 DIGITALLY ENHANCED SPACES IN THE MUSEUM CONTEXT

In this section, a non-exhaustive overview of digitally enhanced spaces that foster the visitor's engagement with an exhibition is presented and discussed. The products and projects listed have been selected from current museum practice in Europe and the United States on the basis of their relevance to the topic of the research. This overview concentrates on projects that illustrate various means of incorporating digital technology to foster visitors' engagement not only with information but also with the physical objects on display, especially in the context of social interaction between participants.

One of the most frequently employed ways of incorporating digital technology into an exhibition space, is the use of interactive installations, which aim to engage visitors with activities loosely connected with the artefacts. These often do not require the visitor to observe museum objects. One example is The Media Kindergarten (Mastej *et al.* 2008) in the modern art gallery Wro Art Centre in Wrocław in Poland, the goal of which is to teach small children about "classical rules and terms of arts (perspective, colour, texture) as well as various aspects of media technologies used in contemporary art (image and sound processing, interaction, real time processing)" (Wro Art Centre 2008). In four different stations, children are encouraged to have not only a full-body engagement, but also social interaction with other users of different ages. For example, the installation 'Textures'

consists of five boxes each containing different materials (stones, water, steam, bark, grass) and a large screen wall projection. Children can trigger visual-sound animation on the screen by putting their palm on different textures. This installation explores the aspect of connection between real and virtual worlds and between child and their physical environment. Although detached from the main gallery and its collection, this example showcases the importance of establishing a space where the relationship between visitor and the exhibited content is fostered.

Physical contact can be used as a means to encourage visitors' engagement with the exhibition space. Examples can be seen in the works of artist Jill Scott. Installations 'Digital Body Automata' (Scott 1996) and 'Beyond Hierarchy?' (Scott 2000) not only engage with the history of "ordinary people and their levels of collective desires and struggles" (Scott 2000) but also with fostering collaboration between visitors. The installation 'Digital Body Automata' was designed to "encourage intimate and contemplative participation" (Scott 1996). This three part digital installation invited visitors to explore how technology might change their body and what effects it might have for the future. The part titled a 'Figurative History' comprises five interactive terminals with smart objects (replicas of artefacts) and corresponding screens. By touching a metal point on the objects, visitors can trigger animated figures on the screens that tell them different stories about the development of artificial intelligence. The viewer not only connects with the objects by touching the trigger point, but also with other viewers. Although encouraging sociability, this installation engages visitors with objects only through replicas and screen simulations. The use of collaboration was developed in another of Scott's installations entitled 'Beyond Hierarchy?' (Scott 2000), which presents insights into the personal lives of Ruhr region workers. It uses a 'secret handshake interface', where the meeting of two virtual characters of the Ruhr region is triggered by a simulation of a handshake of two visitors in real life. By touching hands of other participants, visitors can trigger another animation. These installations investigate the

premise that through corporal contact with objects and people, it is easier for visitors to establish a more personal connection with a virtual world. Scott's works, however, are closed information-centred systems and, like museum kiosks, do not support open-ended exploration. The idea of non-physical contact through fostering imagination is introduced in the next example.

The peep box Electro Bacchanalia is a digital installation that aims to encourage visitors to examine paintings in the gallery more thoroughly (Andersson *et al.* 2007, p.3). It consists of a 17th century style wooden box with a replica of a painting on one of its sides. There is a peep hole in the middle of the painting. When looking through it, the visitor sees a stage-like setup of the painting with a faun and a woman in its centre. The figures dance to music while the visitor is looking through the hole. When the visitor goes away, the performance stops. When visitors look again, the figures dance to a different piece of music. The usage of a peep box is a method often employed in the exhibition design as it draws attention of visitors through the implication of a secret hidden in the box. As in the example above it is used to make visitors look closely at the details of the artefact. It is, however, designed for a single, passive user only, which would be problematic in family-centred installations. The peep box Electro Bacchanalia does, however, show the potential of storytelling to enhance visitors' engagement. By introducing narration to a normally static scene, it promotes imaginative responses to artefacts, encouraging viewers to think beyond the scene depicted. The following example shows a similar approach to engaging a visitor with the object, but in a more active way.

One design solution that allows the balance between artefacts and technology to be maintained is to use intuitive interfaces to engage visitors with an activity. 'Re-tracing the Past: exploring objects, stories, mysteries' is a learning space created to supplement the exhibition held in the Hunt Museum, in Limerick, Ireland in 2003 (Ferris *et al.* 2004, pp.2005-2214). It consists of two rooms – the Study Room and the Room of Opinion. The

first room enabled visitors to explore and learn about 'mysterious' objects from the Hunt Museum collection. In the second room visitors could leave a personal opinion on for what they think the objects were used. The designers of the exhibition aimed to meld the technology into the setting in order to ensure that it is not a distraction to the users. For that reason, they used objects such as a trunk, a picture frame and a radio as interfaces for their installations. The visitors were given key cards with RFID tags, each one representing a mysterious object. The key card triggered interactive stations, giving the visitor information on the object chosen. For example, a 'Virtual Touch Machine' allowed visitors to examine details of an artefact by zooming in and out of its virtual model. A key card placed on the 'Interactive Desk' gave the visitors access to information on the geographical origin of objects. The nature of the given task, to find the identity of mysterious artefact, meant that the installation was highly object-centred. This environment incorporates some elements of a child-orientated space such as freedom of interpretation and movement around the setting as well as an open-ended outcome. However, although replicas of the objects were available to be touched in the Room of Opinion, all interactive activities were designed in detachment to the real artefacts.

The opportunity to engage visitors with objects, not only in a virtual world but also in actual exhibitions, can also be created by online platforms. In the 'Fill the Gap' project, launched in 2009 by the Luce Foundation Center, visitors were encouraged to engage with physical objects from museum collections via online catalogues and Flickr (Goodlander 2009). The Luce Foundation Center is an open storage facility where around thirty three thousand objects from the collections of the Smithsonian American Art Museum (SAAM) are displayed. When one of the artefacts is on loan for longer than twelve months, a replacement is needed to fill the gap on the open storage shelf. To engage their audience and offer them an insight into the backstage of museum work (Askanase 2009a), the Luce Foundation Center shared on their Flickr account photographs of cases that needed a replacement artwork, together with technical

specifications and information on objects surrounding the free space. Participants were invited to search the online catalogues of the SAAM and suggest a substitute. Although visitors were engaged with physical objects only in an indirect way, via social media channels, their actions had direct results in the form of a real artefact being displayed in the exhibition space. This created an opportunity for visitors not only to build connection with objects, but also to understand the work of the museum as an institution. By opening their catalogues to the public, the museum enabled visitors to gain a personal experience that was significant to the whole community. Social interaction between visitors was, however, supported only through the social media channels. The task itself was time-consuming and not many participants joined the project (Askanase 2009b). Additionally, the nature and volume of the task meant that it was more suited to amateur-experts rather than average visitors and especially not suitable for children. Nevertheless, engaging visitors with the museum collection through open online catalogues and social media provides an opportunity to create family-orientated projects run directly in exhibition venues.

Another way of engaging visitors with objects on display is to use mobile technology in combination with QR codes (Gray et al. 2012: QRator project) or Augmented Reality (AR) markers. One example is the family activity called 'Passport to the Afterlife' launched by the British Museum in November 2012, within a series of AR experimental projects (Mannion 2012). 'Passport to the Afterlife' is a two-part trail for families with children aged 7 to 10. Visitors follow an augmented reality trail around the galleries using mobile phones provided by the museum and collect missing words of spells from the ancient Egyptian Book of the Dead on an accompanying paper worksheet. Then, with the information gathered, they compile their own passport in the Samsung Digital Discovery Centre (British Museum Flicker 2013; Trustees of the British Museum 2013). This project was especially successful among families, where the use of mobile technology with paper worksheets fitted the child-parent group dynamic with the child as leader and the parent

as facilitator (Mannion 2012). Although the activity took participants for a journey through museum galleries, it was task-orientated and only loosely connected with objects on display. Free exploration of the exhibition space was, however, supported and the lack of a single correct answer enabled an open-ended outcome. While mobile technologies still present design challenges to be overcome (e.g. difficulties in supporting multi-user groups, preoccupation of participants with technology), they nevertheless create opportunities for designing object-centred, participant-driven activities and environments.

An example of engaging visitors with objects on display through social interaction was the project 'Ghost of a Chance', launched in The Smithsonian American Art Museum (SAAM) in 2008. This was the first Alternate Reality Game (ARG) to be hosted by a museum (Bath 2008, p.1). An ARG is an immersive experience game that encourages players to interact with a fictional world using the tools of the real world (websites, email, telephone, conversations, etc.) (Bath 2008, p.1). The theme of 'Ghost of a Chance' was putting spirits that haunted museum objects to rest by solving several clues embedded in various media (email, Facebook, Flickr and YouTube) and in-gallery meetings of participants and museum workers. As a final event, held in the SAAM, visitors could join six quests that were linked to six spirits and, by completing them, put those spirits to rest. Each quest started with a marker by an artwork and led visitors through the whole museum to fulfil a specific task. This forced many visitors to visit parts of the museum to which they had never been or to look at objects from new perspectives (Bath 2008, p.12). Some of the participants admitted in a post-event interview that the game "gave them a sense of community with the museum workers and other participants" (Bath 2008, p.13), made them interact with the objects and experience the museum in a new, exciting way. This is an example of a project which focuses on museum objects as triggers for action. It shows that through open-ended and process-focused tasks, visitors can be engaged in shaping

the exhibition space (Bath 2008, p.13). Digital technology, however, was employed only in the initial phase of the project, and then mostly as a means of communication.

2.4.2 DIGITALLY ENHANCED SPACES FROM OUTSIDE MUSEUM PRACTICE

All the examples above focus on educating and imparting knowledge. As this research concentrates on child visitors' engagement with objects on display, it is necessary to look at examples of digitally enhanced spaces that aim to engage young users, rather than to educate. Examples of these can be found outside museum practice and provide insights on how conventional exhibition spaces can be improved. These examples can be loosely divided into categories (Sturm *et al.* 2008): interactive surfaces, digital playground props, interactive playground installations, pervasive games and intelligent playgrounds.

The first category is that of 'interactive surfaces' such as floors and walls. These surfaces are play areas resembling traditional playgrounds where children can use digital features to enhance games that are already known. One example in this category is a design by Clara Gaggero and Sabine Feketen called dot°, which was awarded the Innovate to Educate Award by Futurelab in 2006. Its description states that

> *dot° is an interactive playground that can be unrolled like a carpet. It uses interactive pressure sensors and lighting to illuminate games onto the surface of the playground (...). Different games can be uploaded and changed at any time (Futurelab 2006).*

The possibility of changing the rules of the game as well as designing new playground patterns fosters children's creativity and playfulness. This installation is an example of utilising simplicity and modularity (Seitinger 2006, pp.36-37) in order to foster open-ended, user-driven actions. Although tested for object-less spaces, simple and modular design solutions might be followed in object-rich exhibition spaces. While physical engagement promoted in the interactive surfaces is difficult to utilise in a museum,

fostering social interactions between users has the potential to initiate engagement also in exhibition spaces.

The second category involves the use of digital playground props, which are reminiscent of material things that are brought by children to the playground in order to enhance their play experience (Sturm *et al.* 2008, p.259). One example, Morel, is a soft cylindrical object that can be used like a ball, but which can detect other Morels and connect with them (Iguchi and Inakage 2006, p.1). When another Morel is detected, the player is warned by a sound signal. The Morel behaviour does not contain the rules of any particular game. This encourages players to enhance already known games or make up their own. Such open-ended solutions are also useful in child-orientated exhibition spaces. For example, a digitally-enhanced prop in a museum would allow using objects familiar to child visitors as guides that help them to enter and further the storyline of an exhibition space. Props that communicate with one another could be used to foster cooperative behaviours between visitors.

The third category of digitally enhanced spaces is interactive playground installations. (Sturm *et al.* 2008, p.259) These are installations that are designed for outdoor play. One such example, the SmartUs installation, is an outdoor play equipment that allows children to take part in a 'live' computer game. It consists of a three basic elements:

> *a central unit that controls all actions (iStation), poles with built-in sensors (iPosts), an interactive grid (iGrid), and identification labels (iTags) that interact with the iStation through sensors on the iPosts. In addition, the installation provides a software package that enables the users to create their own games (Sturm et al. 2008, p.259).*

SmartUs installation can be incorporated into a traditional playground. Players first log into the SmartUs with identifier iTags (RFID cards) and choose a game they want to play from the screen of the iStation. They can stay on the iGrid, which comprises twelve tiles (3

operational tiles for managing functions on the grid and 9 tiles for game jumping) (SmartUs Website n.d.). Alternatively, they can choose a running activity that incorporates iPost spread around the playground. Players swipe their cards past the inbuilt iPosts or iStation sensor when playing and score points. The scores of completed games are uploaded to a database and can be compared with other users, also from a computer at home. As in the case of digital floors, interactive playground installations give users the possibility to enhance or adapt well-known games and make up their own ones. They, therefore, promote participant-driven and cooperative, but also often competitive behaviours. The physicality promoted by interactive playground installations, however due to safety concerns, cannot be translated directly to an exhibition space. The notion of creating communities and teams interested in one subject (game) and supporting the exchange between users through a network is, nevertheless, a possibility also for a museum.

The fourth category is that of pervasive (or location-aware or augmented reality) games. As a consequence of the swift growth of mobile communications and wireless technologies, it has become possible to unite the experience of a computer game with the physical environment of the player through pervasive games. In contrast to other categories, these are not restricted to any specific location and can be played in unconventional game venues, such as streets, conference halls and museums (Strum *et al.* 2008, p.259; Montola *et al.* 2010). Although initially designed for adults (e.g. 'Can You See Me Now?' by Blast Theory n.d.), pervasive games have been also used to engage younger users. For instance, HeartBeat is an augmented version of traditional Capture the Flag game, where the objective is to capture the other team's flag:

> *To play the game, each player is given a small portable device. Players are randomly allocated between two teams; the attacking team (attackers) and the defending team (defenders). Initially all players are unaware of the role distribution. Once the game starts, players get 30 seconds to hide. After this period of time, their role is*

displayed to them through their device. At this point one player in the defending team is randomly assigned a virtual treasure (Magielse & Markopoulos 2009, p.2).

During the game, the heartbeat of each player is wirelessly transmitted as an auditory signal to portable devices, and this allows players to locate one another. HeartBeat enables the comprehension and establishment of a connection between a virtual world and reality through digital technology. This could be followed in a similar project in a museum setting to establish contact between visitors and objects. Although neither open-ended nor object-focused, this example presents the potential of digitally mediated social interaction as a means for engagement.

The fifth category is the intelligent playground. This is an environment with interactive objects that, using technological elements such as sensors and actuators, reacts to the actions of children and actively encourages them to play (Sturm *et al.* 2008, p.258). An example of an intelligent playground is the Ambient Wood Project, conducted by the Equator Project, which took children on a digitally augmented field trip into the English woodlands (Rogers *et al.* 2005, p.56). This was designed to help children connect knowledge gathered in nature and through observation with classroom activities. Providing participants with several portable devices, the Ambient Wood Project enabled them to explore and gather information on biological processes observed in a forest. The children's positions were tracked by GPS, and the locations of their discoveries were transmitted to their handheld computers. The children could then reflect upon the outcomes of their research on screen after coming back to the classroom by analysing and comparing data gathered, discussing and sharing them with other participants (Rogers *et al.* 2005, pp.56-57).

In this project the technology is used as a tool to gather information needed to complete a given task and to help children to reflect on a lived experience outside the classroom. It is, therefore, task-orientated rather than process-focussed. Translated into a museum space,

in terms of its design it resembles traditional paper exhibition worksheets. Nevertheless, it is an example of utilising digital technology to encourage object-centred actions driven by users, which could potentially allow children to create a personal connection with objects encountered.

2.4.3 Summary: Designing for object-centred social interaction

The overview above set out to examine current exhibition practice and the use of digital technology as a means to foster engagement of visitors with enhanced spaces.

The analysis of examples from museum practice has shown that digitally enhanced exhibition spaces lack contact (physical or non-physical) with artefacts. Direct contact with objects is generally avoided. Artefacts are often omitted entirely (Media Kindergarten), replaced by replicas (Re-tracing the Past exhibition) or virtual simulations (Electro Bacchanalia). Additionally, most installations are placed in detachment to the main exhibition area where the original objects can be seen. Similarly, physical activity, which in conventional exhibition is seldom possible due to the constrained space and because of safety reasons, is often replaced by physical contact with interfaces, as in the Media Kindergarten and the installations of Scott. Visitors are encouraged to engage with the exhibition space, rather than objects. This emphasises the lack of engagement with artefacts and creates a design challenge to be overcome. It is also evident from the examples presented that the social aspect of a museum visit, especially in the intergenerational context of a family, is often neglected. Some digitally enhanced spaces are still designed similarly to traditional computer games, where the solo-user model of interaction is supported, as in the example of the peep box Electro Bacchanalia, which is available only to one user at a time. The encouragement of open-ended exploration and participant-driven action is present more and more often, especially in spaces that aim to foster visitors' imagination and curiosity. Examples include the 'Passport to the Afterlife', where families can explore the space according to their interest and the Re-tracing the

Past exhibition, which encouraged visitors to take up the role of a detective on a quest to discover the identity of an unknown object. 'Ghost of a Chance' and 'Fill the gap' allowed visitors to suggest the content and shape the dynamic of the activity by using virtual databases and communication via social media platforms. The connection between real and virtual, digital and analogue is present in all examples, but fulfils different functions. Digital technologies have been used to create a space of bodily engagement (the Media Kindergarten), to encourage communication between visitors ('Ghost of a Chance'), to deliver information (Scott's installations), to engage participants in the behind scenes work of the museum ('Fill the gap'), to lead visitors through the exhibition ('Passport to the Afterlife'), to foster imagination (Electro Bacchanalia) and to create an immersive environment (Re-tracing the Past exhibition).

One common thread in the examples outlined above is the stated aim of the designers to encourage learning and knowledge acquisition in visitors. There is an evident lack of encouragement of object-centred social interaction. An alternative approach is not to aim to educate visitors but instead to seek design solutions which foster personal engagement with objects. It is this approach that is taken in this research.

The analysis of examples from outside museum practice delivers several insights that are useful in designing digitally enhanced spaces in a museum setting. The design of these spaces is based on the characteristics of play (cf. § 2.3), where digital technology is used to support open-ended, participant-driven explorations and social interactions. All examples presented feature sociability as a means to engage users, which is also a possibility in an exhibition space. On the one hand, this is achieved through the design of games (e.g. dot°) and educational activities (the Ambient Wood Project), whose task-orientated lens, however, might evoke competition rather than cooperation (SmartUs). On the other hand, social interaction is encouraged by designing multimodal spaces available to multiple users (dot°, HeartBeat). Additionally, the examples from outside museum

practice focus on encouraging users in a more active role through giving them the possibility to choose an activity or create their own rules and games (dot°, Morel). However, as most of the digitally enhanced spaces presented are designed as games (Koster 2005, pp.12-14), they are task-orientated rather than process-focussed. An exhibition space that focuses on the visitors' experience rather than the outcome of the visit would support both participant-driven and process-focussed actions. As in traditional playgrounds (cf. § 2.3), physicality, especially in the sense of physical activity, is underlined in all examples from outside museum practice as a vital component of engaging children. While, due to safety concerns, such physicality cannot be translated directly into a conventional exhibition space, movement through the exhibition space and contact with objects through non-physical means can be fostered.

Finally, the examples from outside museum practice underline the role of digital technology not only as a means to provide additional content or features, but first and foremost as a tool to connect users with their physical environment (HeartBeat, the Ambient Wood Project). Such an attitude toward technology, lacking in the examples from museum practice, presents a possibility for spaces where support of contact between user and object is needed.

2.5 TOWARD HUMAN-OBJECT ENGAGEMENT

As this research focuses on using digital technology as a tool to encourage children's engagement with museum objects (cf. § 1.4, p.24), the literature review has discussed relationships between three main components: artefacts as triggers of personal responses and social interactions (cf. § 2.2, p.34), children within family groups as a particular visitor target group (cf. § 2.3, p.38) and digital enhancement as a means to initiate engagement (cf. § 2.4, p.44). It can be concluded that objects in conventional exhibition practice are mostly utilised as illustrations of information and their potential to be triggers of engagement is not fully explored. Existing museum experience models

concentrate mostly on the cognitive aspect of the museum visit, which is mirrored in the design of the digitally enhanced exhibition spaces presented (cf. § 2.4.1, p.46). For children, who engage mostly through physical contact, imagination and social interaction, alternative means of initiating engagement have to be sought. As a result, the need for a new museum experience model has arisen. For the purpose of this research, a human-object engagement model has been devised, which focuses on the personal responses of visitors to objects on display: the Social Dream Spaces Model. This model is based on the concept of the dream space, from the Symbolic Spaces Model by Annis (1986), expanded through the introduction of a social aspect and is discussed in the following sections.

2.5.1 THE SYMBOLIC SPACES MODEL

The Symbolic Spaces Model (Annis 1986, p.169) introduces the concept of the 'dream space', which is used in this research as a basis for developing a new human-object engagement model for exhibition design. According to Annis (1986, p.169), a visit to a museum is an interaction between objects and viewers and happens simultaneously on several levels. He calls these levels 'symbolic engagements' or 'spaces'. In his article *'The museum as a staging ground for symbolic action',* Annis (1986, pp.168–171) describes a museum visit in terms of journey through three distinct spaces: a cognitive space, a pragmatic space and a dream space.

The cognitive space is connected with knowledge gain and the educational purpose of museums. Here the viewer's perception is closest to that of the curator. The design of a museum often reflects the cognitive space of a curator who makes an effort to present a particular set of ideas. Most visitors, however, are likely to enter the cognitive space only selectively, scanning for "objects that have personal comparative value" (1986, p.170). The majority of work done in the museum field is currently focused on the cognitive space (Falk & Dierking 1992, p.175; Hein 2002, pp.191-200). This, however, is not in line with the latest definition of a museum, agreed by The International Council of Museums

(ICOM), which includes enjoyment as one of the three purposes of museum[1]. This definition indicates a broadening of the meaning of a museum to a place of informal learning and a leisure time institution.[2] As a consequence, museum practitioners, including exhibition designers, should take the myriad of influences that shape the museum experience (Falk & Dierking 1992, p.175), including pragmatic and dream spaces, into account.

The pragmatic space is described by Annis (1986, p.169) as "a field of activity in which physical presence rather than objects have meaning". Here the museum becomes a stage, where visitors can act outside of or within their defined social roles (Annis 1986, p.170). They can play roles of social equals (family members, friends, tourists) or unequals (guide/guided, teacher/pupil, parent/child). This corroborates the work of Falk (2009, p.158), who distinguished five categories of visitor types (according to their motivation): explorer, facilitator, experience seeker, professional/hobbyist and recharger. One person can experience different visitor roles at different moments; visit a museum with a child one day (facilitator), have a quite lunch break on another (recharger). Annis states that being together in a museum is a particular social union for visitors and their companions, and this is both the purpose and the product of the visit (Annis 1986, p.170). The pragmatic space concentrates on visitors themselves and the museum is congenial to acting out social roles (Annis 1986, p.170). Visitors' relation to artefacts on display, however, becomes essential only in the third space, the dream space.

[1] ICOM 2007, agreed on the 22nd General Assembly in 2007 in Vienna: "The museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment" (ICOM 2007).

[2] Compare: ICOM Statutes, Calgary, Canada, annual symposium, (June 30 to July 2, 2005): "The museum is an institution for the benefit of society, devoted to exploring and understanding the world by researching, preserving and communicating, notably through interpretation and exhibition, tangible and intangible evidence that constitutes the heritage of humanity. It is a not-for-profit institution" (Vieregg 2006, p.19).

The dream space is "a field of subrational image formation" (Annis 1986, p.169). In the museum, it describes a place of "interaction between suggesting/affecting objects and the viewer's subrational consciousness" (Annis 1986, p.169). Annis explains further:

> *The viewer's mind and eye subrationally seize upon certain objects that jolt memory or recognition and provoke internal associations of fantasy, desire and anxiety. That subset of objects marked off by the mind and eye delimits dream space. (…) In museum dream space there is a flow of images and meanings – highly personal, sometimes lulling, sometimes surprising, more or less conscious.*

Here objects become meaningful to people. "Like our dreams, the museum dream space has images and meanings, and they are personal" (Korn 1992, p.170). As the definition of dream space suggests, not all objects trigger personal reactions, only those that are suggestive or affective. These are the evocative objects referred to by Turkle (2007, p.5), which accompany our lives and provoke thoughts (cf. § 2.2.1, p.36). Museum objects become "triggers of chains of ideas and images that go far beyond their initial starting-point" (Jordanova 2006, p.23). If we accept the model of the Symbolic Spaces, we acknowledge imagination, emotions, senses and memories as vital components of a museum experience.

This research proposes using the concept of the dream space in practical applications with the aim of fostering child-object engagement in the conventional exhibition context. Annis, in his Symbolic Spaces Model, presents the dream space only in regard to an individual visitor. As children in this study are considered within the context of a family group, the dream space has been expanded through the inclusion of a social aspect, which is discussed below.

2.5.2 EXPANDING DREAM SPACE INTO SOCIAL INTERACTION

Annis's dream space does not take the social aspect of a museum visit into consideration. To Annis (1986, pp.169-170), the social aspect belongs to the pragmatic space and even

there the focus lies on the social role of a visitor. For the purposes of this research, social roles are incidental: communication of individuals regardless of their social role is the focus. Therefore, Annis's idea of the dream space must be expanded through the introduction of a social aspect which includes social interaction, such as in the following model devised by Falk and Dierking (1992 pp.173-175). Their Interactive Experience Model is based on the notion that "all experience, and subsequent learning, is contextual" (Falk & Dierking 1992, p.173). Falk and Dierking describe the museum experience not in terms of spaces but in terms of three contexts: physical, social and personal (Falk & Dierking 1992, p.173). They argue that the social context is created through the social interactions of people who meet in the museum spaces. This view of the museum as a space for social interaction expands on Annis's individual social role of a visitor to a more holistic view of interaction not only between visitors but also with museum workers. A similar broader view has been expressed by anthropologist Nelson Gruburn (1977 cited in Korn 1992, p.171), who identified what he calls an 'associational' need as one of the human needs that a museum can fulfil. Visitors relate to one another and this act of sharing becomes their experience of the museum visit. This is underlined by McManus (1988, p.43) who states that:

> *The social aspect of visitors to the museum is not a mere enjoyable overlay adding pleasure to the museum experience for visiting groups. It is, rather, at the core of that experience and a fundamental source of satisfaction in museum visiting which is brought to the museum.*

On this level, museum objects become social objects (Simon 2010, § 4) that present starting points around which conversations and interactions happen (cf. § 2.2.2, p.36). Both Annis's theory as well as that of Falk and Dierking, suggest that museum practitioners should broaden their view on visitors' museum experience beyond designing physical spaces that communicate knowledge to the audience. Exploring dream spaces of individuals in a social context may lead to a better understanding of a visitor's total museum experience.

2.5.3 *The Social Dream Spaces Model*

On the basis of the dream space described by Annis (1986), expanded by the inclusion of a social aspect, this research presents a new human-object engagement model: the Social Dream Spaces Model. This model defines social dream spaces as

the dream spaces of individuals, which, through communication of engagements and responses, influence and are influenced by one another, resulting in a social union created between visitors with museum objects at its heart.

The Social Dream Spaces Model does not take the cognitive and pragmatic spaces of Annis's model into consideration and focuses solely on the dream space as a core element of the new model.

Like the dream space itself, social dream spaces are characterised by contact and engagement with the object. Social dream spaces occur on two levels: personal and social. Through contact with the object, a personal response of the viewer is triggered. This response can be communicated to other viewers and in turn may trigger further personal evocations, which can also be shared. This process leads to the enrichment of the dream space of each individual, which would not happen if each person were alone. The characteristics of social dream spaces are discussed further in section 3.1, p.65. The Social Dream Spaces Model is used as the basis for developing the design intervention for the empirical part of this thesis (cf. § 5, p.127).

2.6 Summary: Designing for Engagement

The literature review has examined the context of the research with detailed investigation of engagement with artefacts, attitudes towards child visitors and the incorporation of digital elements into conventional exhibitions. The overview of design practice in digitally enhanced spaces shows that there is a need for research, in particular on the design of those spaces that enhance children's engagement with museum objects. The discussion on conventional exhibition practice outlined above (cf. § 2.5, p.58) has demonstrated the

need for a new human-object engagement model. For the purpose of this study, the Social Dream Spaces Model has been developed (cf. § 2.5.3, p.63). Additionally, for designing with children as the target group, the importance of the features of play, such as sociability and open-endedness, have been emphasised (cf. § 2.3, p.38). Based on the Social Dream Spaces Model, criteria for application in design practice have been formulated, which take the features of child-orientated spaces into consideration. According to the Social Dream Spaces Model, any exhibition space designed to promote communication of personal responses to objects on display should encourage:

- Physical and non-physical contact with objects,
- Engagement with objects,
- Communication between visitors.

An exhibition space that promotes children's engagement with objects on display must encourage contact with non-tactile artefacts in showcases. In this research, digital enhancement serves as a medium to initiate this contact. Incorporating the features of play, engagement with artefacts is fostered through participant-driven, open-ended exploration. Communication between visitors is enabled by encouraging sociable, cooperative behaviours, especially between members of the family. These combined criteria constitute the framework for the development of a prototype of a digitally enhanced exhibition space that facilitates the engagement of children and their families with museum objects.

3 MEASURING THE INCONSPICUOUS

The previous chapter introduced the Social Dream Spaces Model of engagement with museum objects (cf. § 2.5.3, p.63). This chapter explores the indicators of social dream spaces and outlines the methodological approach and tools used to gather data for further investigation.

The aim of the empirical part of this research (chapters 4-6) was to use the Social Dream Spaces Model as a framework for designing a prototype for a digitally enhanced space in a conventional exhibition context and to examine the usefulness of this approach. In particular, the research was focused on objects that are displayed behind glass, where contact through touch is restricted.

3.1 INDICATORS OF SOCIAL DREAM SPACES

In order to examine the indicators of social dream spaces one must first look at the indicators of the dream space. Every dream space is unique (Annis 1986, p.169). Each one is the product of the imagination and experiences of an individual and is influenced by their environment. A dream space is fluid, and changes from moment to moment based on a myriad of factors, too many to number and impossible to measure. While a dream space cannot be measured directly, indicators can, however, be detected. According to the definition of the dream space (Annis 1986, p.169), it occurs when:

1. There is contact with the object.

Contact with the object is physical or non-physical and is necessary for a dream space to occur (Annis 1986, p.169). In this thesis, contact with an object is taken to mean contact of an individual, and includes looking at an object however briefly, pointing at it, coming up to the vitrine and observing the artefact behind glass. This contact may lead to engagement (see point 3, below). If this engagement is communicated verbally or non-verbally to other people, this, in turn, may lead to their contact with the artefact and

engagement with it. The communication of engagement lies at the core of the Social Dream Spaces Model.

2. The object is evocative.

According to Annis (1986, p.169) dream space occurs only in the contact with "suggesting/affecting objects". He elaborates that despite the efforts of curators and exhibition designers, visitors subrationally look for objects of personal comparative value, objects that jolt memory, recognition and internal associations of fantasy or anxiety (Annis 1986, p.169). Such a view on human-object contact is followed by Turkle (2007, p.5) in her theory of evocative objects, which she defines as "objects that we ascribe emotions, associations and memories to". We are familiar with objects as useful, aesthetic, indulging or necessary. Less often, however, we think about them as things with which to think and feel. Not all objects are equally evocative. In order to expand the evocative qualities of an object, they have to be transformed into "companions of our emotional lives or provocations of thought" (Turkle 2007, p.5). In this study, an evocative object is a museum artefact that affects viewers and provokes thoughts, ideas and associations (Annis 1986, pp.168-169, Turkle 2007, p.5). Digital technology is used as a tool to expand the evocativeness of neglected artefacts.

3. There is engagement with the object.

Engagement, in the context of this thesis, refers to a personal, subrational response of a viewer to an object. It includes fantasies, imagination, emotions, senses and memories that are evoked through the contact with the artefact (Jordanova 2006, p.23; Korn 1992, p.170). Although engagements, in this understanding, cannot be directly observed by a third party, their indicators can be noted and include: prolonged time spent looking at the object, verbal and non-verbal expressions of emotions or memories and comments on topics related to the artefacts. These engagements can be contagious and lead to engagements by other visitors. During the empirical phase of this research, the different

types of engagement (self-initiated and triggered by responses of others) were noted and analysed according to types of trigger (particular object, particular person), character of engagement (emotional, educational, social) and time devoted to them. Equally important was the location of artefacts neglected by visitors, as they became the subject for digital enhancement.

It follows, therefore, that there are four types of indicators of the dream space of an individual visitor:

- **Indicators of contact.** Contact includes physical sensations such as seeing, listening, touching, tasting and smelling of an object, as well as imagining those physical sensations. Contact may be observable by a third party.
- **Internal indicators of engagement.** Engagement happens in the consciousness of the viewer and therefore cannot be seen by others. This includes images, associations, imagination, emotions, senses and memories evoked through the contact with the object. Internal indicators of engagement can be retrieved through actions and activities, such as interviews, drawings and storytelling.
- **Non-verbal indicators of engagement.** These are spontaneous responses to objects and can be observed by a third party, e.g. jumping around, touching something, changing facial expression, playing etc.
- **Verbal indicators of engagement** include spontaneous verbal responses to objects expressed through e.g. gasps, sighs, sounds and words. These can be observed and recorded by a third party.

By definition, social dream spaces are loosely connected individual dream spaces experienced in contact with museum objects (cf. § 2.5.3, p.63). Individual visitors' responses to objects are communicated to other visitors and influence them. Social dream spaces have, therefore, additional characteristics in the groups already outlined. For

example, non-verbal indicators of engagement include social behaviours such as pointing to elements of interest or bringing others to objects; verbal indicators of engagement include spoken communication between visitors. The four groups of indicators of social dream spaces include:

- **Indicators of contact**, in which a viewer sees/listens/touches/tastes/smells the object. In the case of social dream spaces there is also contact between viewers.
- **Internal indicators of engagement**, which include evoked images, associations, imagination, emotions, senses, memories, etc.
- **Non-verbal indicators of engagement**, including expressing emotions, pointing at objects, bringing others to object, touching the objects and playing.
- **Verbal indicators of engagement**, which include sharing memories, thoughts, ideas; expressing emotions and asking questions. These can be observed and recorded by a third party.

In this research, a design concept for a digitally enhanced exhibition space was developed according to the Social Dream Spaces Model. The indicators of social dream spaces were measured through direct and indirect methods (cf. §§ 3.3-3.4). This enabled the gathering of data on visitors' responses to the exhibition space before and after the design intervention. Subsequently, a comparative analysis of data gathered was carried out using the categories of indicators as guidelines.

3.2 THE RESEARCH PLAN

The proposed research plan was broadly based on the four phases of the action research approach (cf. § 3.3.1), which is a cyclical problem solving method. In this section, the aims, objectives and expected outcomes of each phase are discussed. Although the phases of action research often repeat or overlap one another, for the purpose of clarity they are presented in a linear way.

Phase I: Reflection / Initial observations

The main focus of Phase I was to gather information and reflect on current museum life, museum activities, types of visitors and their experiences in order to learn about social dream spaces. Research began with a visit to the collaborating museum as a visitor without prior detailed knowledge of the subject or the content it presents. This created the opportunity to experience the museum from the perspective of a first time visitor. The museum was visited several times subsequently, alone or with accompaniment, getting the researcher into the role of a returning visitor. Impressions and observations were gathered in the form of field notes and photographs. In order to get to know the setting and its characteristics from behind the scenes, the researcher took a volunteer position in the museum. Data were gathered through interactions, observations and conversations with museum workers and curators as well as through taking an active part in museum life (archiving, object handling, research and preparation of temporary exhibitions, warding, assisting in art and craft workshops). This fostered an understanding of how the museum works, what its main goals and objectives are as well as which areas need modernisation or change. In order to get to know child visitors, their guardians and their engagement with the museum collection, a series of observations from the point of view of a co-visitor were conducted. The main focus was on behaviour of the members of various sized groups in the museum setting. Other visitors were joined during activities, such as guided tours and craft workshops. This built a base for preparing and conducting the main observation study, which took place over three weeks on the museum site. A systematic study was conducted, based on observations and child-generated images (cf. § 4). The main goal was to gain knowledge about the child-artefact relationship and about social interaction between visitors. Textual and visual material, such as recording sheets, 'Museum Detective Notebooks' and disposable cameras, were used to facilitate observations (cf. § 3.4, p.76). This multi-dimensional data gathering approach enabled insights to be gained on museum life and visitors from various perspectives, allowed the

complexity of the museum experience to be better understood and made the tracking of areas for potential improvement possible.

Phase II: Planning / Data analysis

Data obtained in Phase I were analysed and reflected upon (cf. § 4) using the methods of qualitative analysis (cf. § 3.5, p.83). This delivered information about people's engagement with one another around objects. It also allowed the location and determination of possibilities to enhance objects through design. According to the outcomes of this analysis, the design brief of a digitally enhanced space was created based on the Social Dream Spaces Model (cf. § 4.5.1, p.123). This fed the next step of designing a prototype for the exhibition space.

Phase III: Action / Design intervention

Using the design brief formulated in Phase II as guidelines and boundaries, the conceptual design of a digital enhancement was created. Based on this concept, a prototype was developed and installed in an existing exhibition space of Bantock House Museum.

Phase IV: Observation / Final observation and data analysis

In the final phase, visitors were observed using the prototype and were invited to give feedback. Insights from both the observations made and the feedback received were gathered and reflected upon. Data gathered from the reflection and observation phases were analysed and compared (cf. § 6). This revealed what impact the new designs had made to how artefacts were perceived by children and their guardians. As a final step, the research was documented, analysed and evaluated according to the theoretical framework. Conclusions and recommendations for further research were formulated (cf. § 7).

3.3 THE MIXED METHODS APPROACH

The use of a novel design model created the need for a methodological approach that allowed the research problem to be addressed in a comprehensive manner. For this reason, the mixed methods approach was chosen for data collection and analysis (Creswell & Plano Clark 2011, p.5). The experiential character of social dream spaces supported the use of qualitative research methods. As some potentially useful quantifiable data could also be gathered, they were used to produce additional quantitative information. The mixing of data occurred through embedding supportive quantitative datasets within the main qualitative dataset (Creswell & Plano Clark 2011, pp.71-72). Both of these sources together, collected in a single study, provided a broader picture of the research problem. A manifold approach is particularly important in the museum setting, where various parties (museum workers, educators, parents, teachers and children) and interests (social, political, educational, research, entertainment) are involved.

Additionally, this research combines theoretical enquiry with design practice. As Denscombe (2010, pp.138-139) states, "the mixed methods approach is 'problem driven' in the sense that it treats the research problem – more specifically answers to the research problem – as the overriding concern." Such an approach is common for design research (Yee 2010, p.14), where research methods are combined with practice-based methods. As this study was driven by the search for a design solution that encourages children's engagement with objects in showcases, ethnographically-informed data collection methods were combined with a design intervention that supplemented the exhibition space under study. This mix of methods was structured based on the action research approach, which is discussed in the following section.

3.3.1 ACTION RESEARCH

As action research is mostly applied to "hands on", small scales studies that aim to produce both action (introduce a solution to a practical problem) and research (add to the body of knowledge of a particular field) (Cajander & Eriksson 2010, p.87, Knock 2013), it was regarded a suitable strategy for this research project. On the one hand, through the design intervention, this research sought ways of fostering children's engagement with museum artefacts. On the other hand, it aimed to collect and analyse data on how visitors relate to the objects on display within the conceptual context of the Social Dream Spaces Model. While action research shares features, e.g. the cyclical approach to gathering data, with design approaches such as User-Centred Design (Jordan 2000; Norman 2002; Friess 2008) and participatory design (Ivey & Sanders 2006; Sanders & Stappers 2008), there are important differences. In the case of User-Centred Design, the goal is different. Action research is focused primarily on contributing to scholarly knowledge and to the understanding of a particular field and not on creating or optimising a product (Denscombe 2010, p.122; Hayes 2011, p.16, Knock 2013). In the case of participatory design, users are engaged to create or improve the design (Sanders & Stappers 2008, p.2). The approach used in this study, however, was for the users to be observed by the designer in order to determine the design goals and later to evaluate the effectiveness of the design solution.

Action research is a holistic, reflective approach to problem-solving that incorporates various research methods, based mostly on the qualitative research paradigm (O'Brien 2001). A widely accepted definition (Carr and Kemmis 1986, pp.165-166 cited by Noakes 2010) identifies three conditions of action research:

- Its subject matter is a form of strategic action that improves a social practice. A social practice indicates the practical nature of action research, which deals with real-world problems and leads to a change (Denscombe 2010, p.126)

- It is conducted in a collaborative manner that includes active participation of practitioners in the research process.
- It consists of a series of phases (reflection, planning, action and observation) called the action research cycle (Figure 3.1) that can be repeated according to the needs of the project.

These three conditions are met in this study as follows:

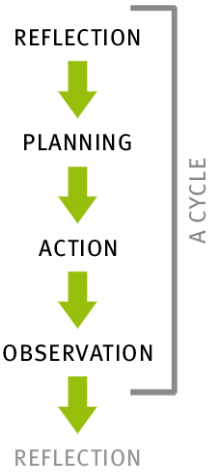

Figure 3.1. Action research cycle

- This research aims to improve the social practice of museum visiting. An attempt is made to create a design concept of an exhibition space that initiates contact between child, family and artefact.

- This interdisciplinary project involves active engagement of various participants, i.e. curators, museum workers and volunteers, child visitors and their families. They were involved in the data gathering process and in testing the implemented prototype.

- The research was carried out in several stages that are flexible and repeatable according to the needs of the research process and its participants.

Action research is a strategy rather than a specific research method (Denscombe 2010, p.126). In this study, action research constitutes a base for research plan development (cf. 3.2, p.68). Within the action research framework two approaches were used: ethnographically-informed field studies for data collection and design intervention for data generation.

3.3.2 *DESIGN ETHNOGRAPHY*

Ethnography, which has traditionally been used to study foreign cultures, is now being used in a broader meaning to observe people in their lived context. As Denscombe states, it focuses on "understanding things from the point of view of those involved" (2010, pp.80-81). In this research, field studies using ethnographically-informed techniques were conducted in order to analyse visitor-visitor interaction, with museum objects as a subject and context of interaction.

Several design disciplines, including interaction and service design, share "a strong focus on the experience of people in their own context during all stages of the design process" (Segelstroem *et al.* 2009, p.4350). For that reason, an ethnographic approach can be applied during most stages of designing, from learning about the project context to product testing with users. Ethnography allows designers to develop empathy with clients and participants as well as to identify key areas of study (Jones 2006, p.84). For instance, in the Walking quiz case study (Segelstroem *et al.* 2009, pp.4353-4354) ethnographically-informed techniques were used in several stages of the research as a way of raising understanding of and improving the living circumstances for the elderly. This method also allowed an evaluation of the implemented design. Accordingly, in this research, a conscious effort was made throughout the project to establish empathy not only with visitors, but also with the museum as an institution. This allowed the researcher to study the project context from several perspectives, which in turn influenced the development of the design solution.

In ethnography, self-awareness of the researcher plays a crucial role in sustaining sufficient objectivity (Denscombe 2010, p.90). The reflexive design practice creates a lens through which this research and its findings should be considered. This study was carried out by a researcher with an interest in shaping the experiences of visitors in museums through digital enhancement of the exhibition space. The researcher was also an outsider

to museum work, an observer, not involved in museum studies or in fulfilling its educational purposes. The research findings were treated as a data source for a design process and used to aid the development of the design concept.

As the target group in this study are child visitors, an ethnographic multi-method that focuses on children's lived experience was required. One such method is the Mosaic Approach, which was developed by Clark and Moss (2011) to contribute to the development of services of a Coram Community Campus in the King's Cross area of London. The main aim in developing the Mosaic Approach was to create a method that "enables young children and adults to be involved in 'meaning making' together" (Clark & Moss 2011, p.3). By using various visual (photographs generated by children, tours and maps) and verbal tools (conversations and observations), the researchers gained a deeper understanding of children's experiences in their lived environment. Although this approach was developed to work with young children in the nursery, it has the potential to be used as a tool with older children in educational and non-educational settings, such as museums. By following the philosophy of Malaguzzi, the Mosaic Approach seeks methods for listening to "different 'voices' of languages of children" (Clark & Moss 2011, p.5). These voices include but are not limited to verbal transmission of ideas. As Clark and Moss (2011, p.5) state, "the voices of young children begin at birth (Pugh & Selleck 1996) and children 'speak' to adults through their play, their actions and reactions (Goldsmith & Jackson 1994)." The Mosaic Approach provides ways of getting to know children's views but also recognises their right to express their perspectives or remain silent (Clark & Moss 2011, p.7). It seeks to treat children as members of community rather than users and consumers. The Mosaic Approach involves a set of different tools (a mosaic of methods) which allow in-depth investigation of a research problem from different perspectives. This approach serves as an inspiration in the development of the pick and mix methodology in this study, which included the use of some of the original Mosaic

Approach tools, such as: observations and cameras. These are presented in following sections (cf. § 3.4, p.76).

3.3.3 SUMMARY OF METHODOLOGICAL APPROACHES

To sum up, a mix of methods that included qualitative research as a framework and allowed the collection of quantitative data where possible was used. This facilitated the acquisition of a better understanding of how children and their families respond to museum objects and how this can be initiated through digital enhancement. The design of the research was modelled on the action research approach. The study was divided into three main stages: initial observations (chapter 4), design intervention (chapter 5) and final observations (chapter 6). Within these stages, the four phases of action research were repeated: reflection, planning, action and observation (cf. § 3.2, p.68). During this study various methods were used in order to gather data, reflect on them, design a prototype of an interactive installation, obtain feedback from users, evaluate the prototype and document the research. These methods and tools, inspired by design ethnography and the Mosaic Approach, are discussed in following sections of this chapter.

3.4 DATA COLLECTION TOOLS

The empirical part of the research focuses on investigation of dimensions of the 'social world' of a museum (Mason 2002, p.85) before and after design intervention. This includes the setting of a museum itself, "its physical, spatial, temporal as well as social organisation" (Mason 2002, p.85). For that reason, a mix of methods based on ethnographically-informed field studies was used, which included observations, participation, child generated images, usage of cameras, interviews and field notes. The following table presents methods used to elicit the indicators of the social dream spaces:

Table 3.1 A list of data gathering methods according to indicators they measure

	Observations	Notebooks	Cameras	Interviews	Field notes
Indicators of contact	✓		✓	✓	✓
Internal indicators of engagement		✓	✓	✓	
Non-verbal indicators of engagement	✓			✓	✓
Verbal indicators of engagement	✓			✓	✓

✓ – method used to elicit indicators from that category

These are discussed in detail in the following sections.

3.4.1 PARTICIPANT OBSERVATION

Observation is the most important methodological tool used both in design ethnography and in the Mosaic Approach. In the latter, watching is a way of giving children a voice and experiencing them in their own environment (Clark & Moss 2011, p.35). Observation is also a tool used in cases where meaningful knowledge cannot be gathered through interviews, because it is not "articulable, recountable or constructable" (Mason 2002, p.85). This applies especially to child participants, who have difficulty in formulating arguments and thoughts and in reconstructing the past in a linear way. This is where participant observation, i.e. participating in the daily life of people under study, is useful. Participant observation can be carried out in three ways (Denscombe 2010, p.207):

- Total participation, where the researcher acts in a disguised role.
- Participation in the normal setting, where the researcher is hidden from most of the people observed.
- Participation as observer, where the researcher's role is openly recognisable.

In this study, it was important to keep the museum setting undisturbed and as close as possible to usual circumstances. Participation in the normal setting in the guise of a museum warden was chosen in order to gain insights into visitors', often unconscious,

behaviour. The covert fashion of such observation preserves the naturalness of the setting without disrupting it by awareness that research is taking place. It also provides an insider perspective, i.e. it aims to gain information that would stay hidden when using other methods (Denscombe 2010, p.206). In this research, observations were used as a non-invasive method of data collection; therefore, the ages of observed visitors were estimated. To maintain accuracy, these ages were confirmed through supplementary methods, i.e. interviews and notebooks.

Observation is seen in this research as a way of generating "multidimensional data on social interaction in specific contexts as it occurs, rather than relying on people's retrospective accounts, and on their ability to verbalize and reconstruct a version of interactions or settings" (Mason 2002, pp.85-86). This position is based on the premise that the researcher can be "an interpreter or 'knower' of such data as well as an experienced observer, or participant observer" (Mason 2002, pp.85-86). Through active participation in museum activities the researcher shared a lived experience with other visitors and developed empathy with them. The researcher's active participation is open to be criticised as an example of a "simplistic 'standpoint' position" (Mason 2002, p.86), i.e. a researcher cannot possibly know all the perspectives that participants are coming with. In this research, however, the observation is only part of a mix of methods and the data gathered during active participation are compared with data gathered through other methods.

As in ethnographic studies, the observations were carried out in a context familiar to the participants. The observation was structured to investigate the indicators of dream spaces. Two kinds of data were collected. Qualitative information was collected through observations of behaviours and overheard conversations. Quantitative records were obtained as answers to the recording sheets. In order to maintain the highest possible rigor, while creating empathy, data were gathered from other sources: notebooks and

photographs in initial observations as well as interviews with participants and field notes in final observations.

Recording sheets were designed as an aid to carrying out a systematic observation in the museum. They were filled out by the observer (the researcher or a volunteer) during the observation of a visitor group. They were divided into five sections that dealt with following areas:

- General information (number, gender and ages of participants, place of observation)
- Timing (how much time did the observed group spend: in the particular room, communicating around exhibition elements, looking at objects behind glass)
- Interaction with the exhibition (What did visitors do while in the particular room?)
- Non-verbal interaction between members of the group
- Verbal interaction between members of the group

This division also facilitated data slicing and categorisation during analysis. The template of the recording sheet is included in Appendix 8.1, p.199.

3.4.2 NOTEBOOKS

Notebooks were used to acquire information on the children's emotions and thoughts towards the exhibition in a non-verbal way. They were filled in by the child visitors. Bantock House Museum already ran a series of 'Museum Detectives' quizzes, which were a paper version of a treasure hunt. These quizzes were quite popular with the children, especially those aged from 6 to 12 years old. Children could choose from three levels of difficulty, which led them through various paths through the museum. During preliminary observation, it became clear that 'Museum Detectives' quizzes were a medium of cross-generational interaction. Four patterns of interaction were noted while the quizzes were being filled in:

- A child fills the book in alone without adults' help.
- Families fill them in together, where the adult is a facilitator.
- Family members take turns filling the book in.
- The child initiates play with the book; parents assist the child until they (the child) become uninterested. The parent takes over the game and fills it in to the end.

The last pattern was especially interesting, as those adults became involved in a task that is not intended for adults, often totally immersing in the process.

Building upon the success of 'Museum Detectives' quizzes, a 'Museum Detective Notebook' was developed that contained a series of questions and tasks for children to fill in (for a template see DVD § 8.4.1). It invited children to note their observations on the museum visit in:

- a textual way by finishing sentences such as: "Today the museum made me feel…", "The most amazing thing I saw in the museum today was…" and "If I could change something in the museum it would be…"
- a non-textual way by drawing their favourite room or object in the museum.

Some of the drawing and writing tasks paraphrased each other. This was done to gain duplication of tasks and answers in order to cross-check if children would answer them in the same way.

3.4.3 CAMERAS

Disposable cameras were another non-verbal tool of expression used in this research. Photography is a means of communication that appeals to many children. It is a mode of expression most often performed by adults, and not available to children. Children observe photographs as playing a significant role in the life of adults and, therefore, perceive them as something of value. This is not always true for drawings and paintings, through which children are mostly encouraged to express themselves (Clark & Moss

2011, p.20 & 24). Photographs offer a new language, that children can use to "convey their feelings as well as information through 'the silent voice of the camera'" (Walker 1993 cited in Clark & Moss 2001, p.24).

Disposable cameras were chosen because they are a good compromise between quality and usability. Children easily learned how to use them and were not preoccupied by technology more than was needed to fulfil the task. The relatively small size and weight of the cameras allowed children to carry them around throughout the whole museum visit.

3.4.4 INTERVIEWS

Clark and Moss (2011, p.15) suggest child conferencing (semi-structured interviews) as an aid to participant observations. Mason (2002, p.63) recommends conducting interviews when "people's knowledge, views, understandings, interpretations, experiences, and interactions are meaningful properties of the social reality which your research questions are designed to explore". In the final stage of the empirical part of this research, visitors' perceptions of the digitally enhanced spaces were meaningful for the evaluation process. For that reason, this tool was used as a supplementary data source. Interviews were, in this stage, a more effective data gathering method than 'Museum Detectives Notebooks', as they delivered immediate impressions of visitors of the two rooms under study. The usage of visual prompts is a technique that helps visitors, especially children, to recall their visit (Mason 2002, p.78). The interviews were conducted in the corridor between two rooms under study, in order to allow participants to look inside. The structure of the interviews combined subjects contained in the recording sheets and notebooks (from previous phase), e.g. asking about interactions with museum elements and conversations, personal likes and dislikes as well as surprises experienced (cf. Appendix § 8.2, p.201).

3.4.5 *FIELD NOTES*

In the course of this study, the researcher was not only a silent observer of happenings that occurred in the museum environment, but was also a participant, visitor, volunteer and facilitator. These various roles enabled the gaining of knowledge of different people's experiences, of how those experiences and behaviours occurred and where they led. Field notes gathered during those participations were reflected upon in order to find patterns or themes that could further feed the design process. Additionally, in the final observations, data gathered through interviews were compared with field notes made by the researcher immediately before interviews. They consisted of recordings of non-structured observations of family visits as well as notes on any non-verbal cues from the interview situation. The field notes not only allowed verification of interview data but also aided the memory of the researcher about the observations conducted.

3.4.6 *SAMPLING STRATEGY*

In a small scale study, particularly of a qualitative character, the use of exploratory sampling is most appropriate for choosing research participants. As Denscombe (2010, p.24) explains, "an exploratory sample is used as a way of probing relatively unexplored topics and as a route to discovery of new ideas and theories". In this research, it was not important to draw conclusions valid for the overall research population (representative samples), but rather to deepen the understanding of children's engagement with objects (exploratory samples).

The exploratory samples were chosen through a non-probability sampling technique, i.e. criterion technique, where selected participants had to meet specific criteria. Cresswell (2007, p.128) states that "criterion sampling works well when all individuals studied represent people who have experienced the phenomenon". This research was conducted in the place of phenomenon occurrence, i.e. in the exhibition space. Each group observed

had to fulfil the following criteria: have at least one adult, have at least one child, and be members of the public and not museum staff.

Additionally, a conscious effort was made to keep the same conditions of data collection before and after the design intervention. Data were, therefore, collected in two sequential years, 2011 and 2012, during spring term holidays, including Easter holidays. During this period, Bantock House Museum receives a higher number of family visits than average. According to museum records, weather conditions, which often influence the number of visits, were also similar in both years.

3.5 EVALUATION AND ANALYSIS METHODS

As a multi-method was selected as a research approach to gather data, a multi-method of analysing those data was also chosen. Qualitative analysis methods were used to create a more coherent picture of social dream spaces in the exhibition space. Quantitative results were also used to underline the qualitative analysis findings. In the following section, the analysis methods chosen for the purpose of this study are presented.

3.5.1 READING DATA: LITERALLY, INTERPRETATIVELY AND REFLEXIVELY.

In this section, the ways of 'reading' data gathered are introduced, in order to identify a perspective from which data are judged. Mason (2002, p.148) proposes three ways of 'reading' data: literally, interpretatively and reflexively. Such a thorough manifold reading made the tracking of indicators of social dream spaces possible.

The main focus of this study was the engagement of child visitors with artefacts, including connected emotions, memories and thoughts. For this reason, the literal reading of data gathered (Mason 2002, p.149) constitutes a rather small part of this research. Analysis of textual and non-textual material covered the words and language used, the sequence and type of interaction and literal documentation of visitors' behaviours, e.g. the most

common ways of interacting with the exhibition (trying on costumes, opening drawers, playing with toys). As a result, documents were generated, which show the outcomes of the observations in graphs (see DVD §§ 8.4.2 & 8.4.6). The quantifiable data were also analysed literally, including how much time visitors spent looking at or engaging with museum objects. The data collected through the literal method are meant only as an addition to underpin the interpretive readings.

Most of the material gathered was viewed as interpretive readings (Mason 2002, p.149). The main focus was to determine visitors' use of and interaction within the exhibition space. Research concentrated on several aspects of this interaction including: the occurrence of particular feelings and behaviours, the identification of favourite objects, the reasons for their attractiveness to visitors as well as the identification of neglected artefacts.

According to Mason (2002, pp.149-150), field notes are responses to situations observed in the setting. They provide an account of how the researcher interpreted what was happening in the moment and later. For that reason, they can be viewed as reflexive readings. In the analysis process, field notes gathered during this study were used to underline and supplement the findings of interpretive readings.

3.5.2 APPROACHES TO SORTING AND ORGANISING DATA

The data were gathered by using a multi-method in order to broaden the scope and depth of understanding of social dream spaces. For that reason, data sorting methods were tailored to each set of data gathered to retrieve possibly rich, but also reliable results. Following Mason (2002, pp.150-171), three sorting methods were used: cross-sectional indexing, holistic approach, and diagrams and charts. The main aim of this step was to interpret and make meaning out of data gathered, especially in regard to the indicators of social dream spaces. The following questions led the analysis:

- In search for indicators of contact:

To which elements of the display did the visitors respond? How did visitors engage with objects on display? Which elements of the exhibition were evocative and which not? Was there any contact observed between visitors?

- In search for internal indicators of engagement:

Which elements of the display appeared in visitors' self generated content (text and images)? What did the visitors communicate through self generated content (feelings, memories, facts)?

- In search for non-verbal indicators of engagement:

How did visitors interact with elements of the display? What emotions did visitors express while interacting with the exhibition space and objects on display and in what way? What were the ways of non-verbal communication between visitors and how did they manifest?

- In search for verbal indicators of engagement:

How did visitors communicate with one another? How and what did they share in verbal communication?

The same questions were asked before and after the design intervention and the results compared. In order to facilitate data analysis, recording sheets (cf. Appendix § 8.1, p.199) were designed with various categories in mind, e.g. time spent in the room, verbal and non-verbal communication between visitors, and contact with the exhibition space.

Cross-sectional indexing was used to analyse most of the data in aspects of social dream spaces such as: frequency of occurrence of social interaction between visitors, time spent on engaging with exhibition elements, types of visitor-visitor and visitor-object

interactions, frequency of engagement with objects, kinds of physical, emotional and intellectual engagements with objects. According to Mason (2002, pp.152-153), cross-sectional indexing can be used in order to get a clear idea of data coverage and scope. It can help researchers to distance themselves from the immediacy of striking elements. Gaining distance was particularly important in this research, where participation in museum life had an impact on the researcher. Cross-sectional referencing was mostly used with text-based data, but was also useful in reading visual material such as photographs. Photographs taken by children were sorted by cross-sectional indexing, and viewed in a literal way including: broad subject matter, camera angle, photographer and composition. The slices of indexed data were used as an aid to look at the dataset thematically. They were treated as loose and flexible groupings of "unfinished resources for a variety of further uses, rather than end products themselves" (Mason 2002, p.157).

In order to gain a more holistic view, the non-cross-sectional approach of data organisation was used with personal and intimate material, i.e. documents such as field notes, interviews, notebooks and photographs. By definition, non-cross-sectional, contextual or case study forms of data organisation "is practice guided by a search both for the particular in the context rather than the common or consistent, and the holistic rather than the cross-sectional" (Mason 2002, p.165). This method was used to seek trends in visitor responses as well as nuances in behaviour that could be lost in the cross-sectional indexing analysis.

In order to aid the holistic view, diagrams and charts were used to visualise various datasets (see DVD §§ 8.4.2 & 8.4.6). These include: demographic characteristics of observed groups (age, gender, number of people), broad subject matter of conversations, favourite and neglected rooms and objects on display.

3.5.3 SUMMARY

The mixed methods approach to data collection and generation was used to gather comprehensive insights on children's responses to digitally enhanced museum objects. Children provided with various tools of communication (interviews, notebooks and cameras) could express themselves verbally and non-verbally. This, supplemented by ethnographically-informed methods (in-gallery observations, field notes), supplied rich quantitative and qualitative material for further analysis.

The design of this study, based on the action research approach, provided a structured, comparative and reflexive framework for research practice. The comparative analysis of data gathered from different sources allowed manifold conclusions to be drawn on children's engagement with the exhibition space. Despite an overlap of findings in some areas, this strategy uncovered the complexity of the material gathered.

Chapters 4 and 6 present the analysis of outcomes from data collection before and after design intervention, which is outlined in chapter 5.

4 STAGE 1: INITIAL OBSERVATIONS

For the first stage of the empirical research, data were gathered through initial observations of visitors in the exhibition space in order to locate evocative objects and the occurrence of indicators of social dream spaces, and to gain a basis for comparison with and evaluation of the prototype's impact during the design intervention. Systematic observations were carried out in seven museum rooms with the help of recording sheets (cf. § 3.4.1, p.77). Additionally, images and texts generated by child visitors' provided supplementary data sources (notebooks and cameras: cf. §§ 4.3.1-4.3.2). The data collected in this stage included several visual and textual materials (see DVD §§ 8.4.1-8.4.3, 8.4.6). These were analysed using qualitative and quantitative analysis methods (cf. § 3.5, p.83). This chapter presents the outcomes of this analysis and presents the design brief that constitutes a starting point for the further design intervention.

4.1 THE RESEARCH VENUE: BANTOCK HOUSE MUSEUM

In the search for a research venue, three institutions were approached: the V&A Museum of Childhood London, Birmingham Museums and Art Gallery and Bantock House Museum in Wolverhampton. These are all collection-based institutions that use the conventional type of exhibition to present objects. Bantock House Museum provided the most suitable research setting, not only because of its relatively small size, which enabled a feasible pilot study to be carried out, but also because of the family orientated nature of its exhibition, which includes objects in vitrines as well as hands-on exhibits that may be touched by visitors. This allowed the gathering of comprehensive data on visitors' responses to different types of exhibits, which would not have been possible in a more limited conventional exhibition.

Formerly known as Merridale Farm, Bantock House became the home of the Bantock family in 1864 when it was acquired by Thomas Bantock, a canal and railway agent and a

successful tradesman. The family house was turned into a museum in 1948. The museum is set within 43 acres of parkland and surrounded by formal gardens. It presents mostly static and non-interactive exhibits including japanned ware, enamels, steel jewellery, toys and porcelain. Although the majority of objects are displayed behind glass, visitors are invited to sit on all items of furniture and explore the hands-on activities throughout the museum (maps and drawers, costumes, colouring sheets and quizzes).

The ground floor of Bantock House Museum consists of a museum shop and three exhibition rooms (Figure 4.2): the Downstairs Hall, the Dining Room and the Drawing Room. The Downstairs Hall (Figure 4.1) features a sitting area around an inglenook fireplace, where visitors can watch a video about the history of the house and browse through a collection of books about the Arts & Crafts Movement. There is also a set of large scale Art Nouveau style drawings, a suit of armour and a golden pulpit in the shape of an angel.

Figure 4.1 The Downstairs Hall (Ward 2009, Wolverhampton Culture, Arts & Heritage)

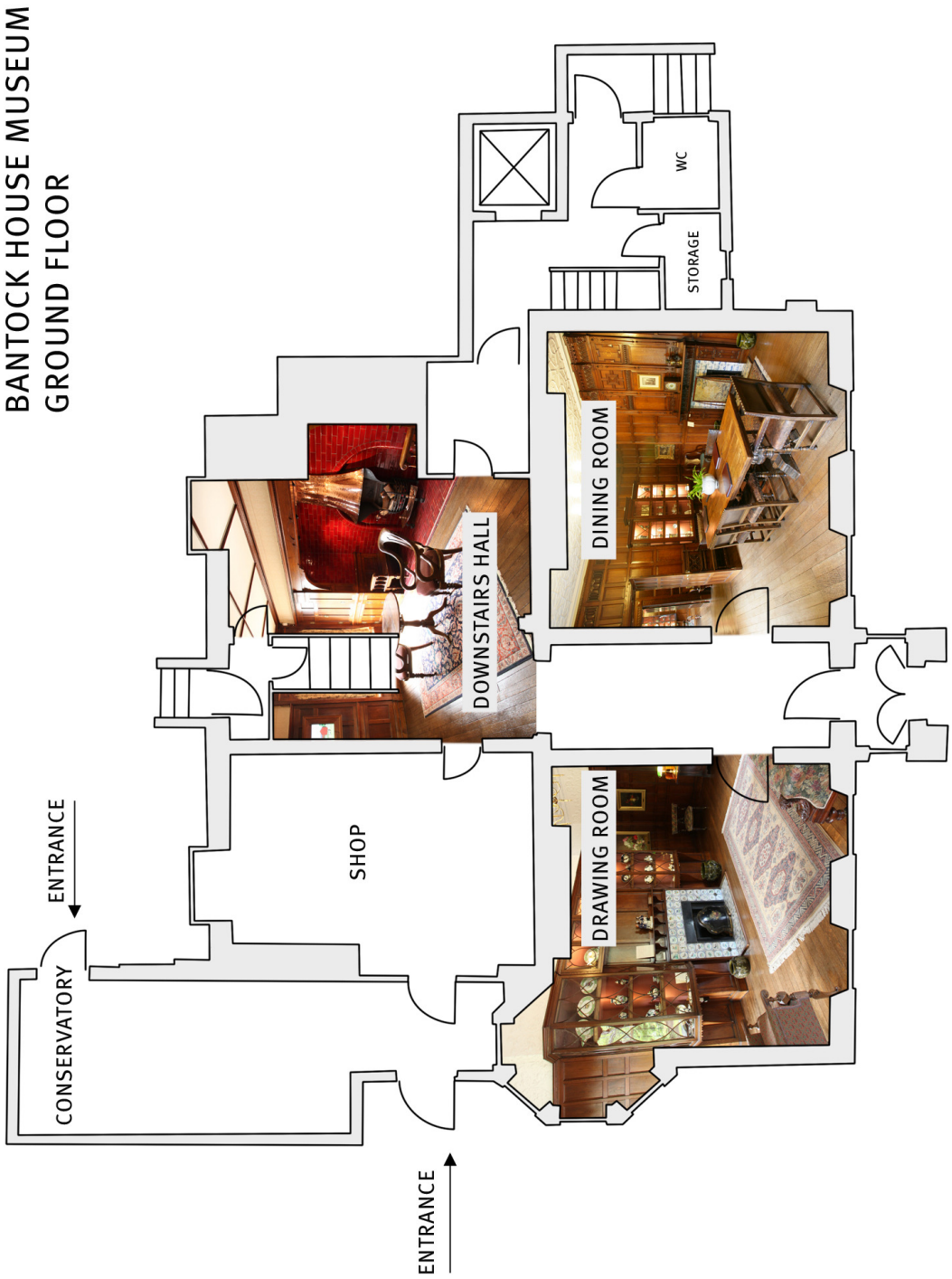

Figure 4.2 The ground floor plan of Bantock House Museum

The Dining Room presents Victorian eating culture theme. The main piece on display here (Figure 4.3) is a large oak table with a set of chairs that can be used by visitors to sit down and read the available manuals. The walls are decorated with paintings of farm animals and glass cabinets with English porcelain. The former dining hatch has been converted into another vitrine, where objects connected with dining (e.g. cutlery and serving dishes) are displayed.

Figure 4.3 The Dining Room (Ward 2012, Wolverhampton Culture, Arts & Heritage)

The Bantock family used to spend their leisure time in the Drawing Room (Figure 4.4), which retains the original relaxed atmosphere. Visitors can sit on a sofa and chairs gathered around a fireplace decorated with Dutch Delft tiles. On the walls there are original oak glass cabinets with examples of Worcester porcelain and enamels.

Figure 4.4 The Drawing Room (Ward 2009, Wolverhampton Culture, Arts & Heritage)

Figure 4.6 (p.94) features four permanent exhibition rooms: the Servants Room, the Billiard Room, the Ladies Room and the Nursery Room. Additionally, temporary exhibitions are held in the Community Gallery, which was not included in observations due to its transient character.

Figure 4.5 The Servants Room (Ward 2009, Wolverhampton Culture, Arts & Heritage)

The Servants Room (Figure 4.5) is a walk through room devoted to the Bantock House servants and housekeeping. There are two mannequins: Henry the gardener and Lily the maid, both dressed in clothing from the period. Similar costumes are available for visitors to try on. Glass cabinets in this room feature Victorian objects used in housekeeping and cooking. Additionally, housekeeping manuals and photographs of some of the servants who worked for the Bantock family are available to read and view.

Figure 4.6 The first floor plan of Bantock House Museum

Figure 4.7 The Billiard Room (Ward 2012, Wolverhampton Culture, Arts & Heritage)

The rather dark ambience of the Billiard Room (Figure 4.7) distinguishes it from other rooms in the museum. This room is a recreation of the original play room of the Bantocks. Next to a few glass cabinets with fishing flies and tobacco boxes, there are several hands-on exhibits, such as illuminated maps of Wolverhampton trade, a box containing tobacco and male Victorian costumes. The drawers of the billiard table showcase objects connected with trade in Wolverhampton. There is sitting area with leather armchairs in the alcove around the fireplace.

Figure 4.8 The Ladies Room: the main exhibition space and the closet (Ward 2009-2012, Wolverhampton Culture, Arts & Heritage)

The Ladies Room (Figure 4.8, p.95) is an example of a Victorian style bedroom. It is based mostly on objects displayed behind glass (steel jewellery, trinkets, enamels, gloves, pens, japanned ware). There is also a restricted area with an original bed, which was owned by Queen Mary, and elements of interior design from the period. A smaller room connected to the main area is a closet with a display of women's clothing, such as corsets, skirts, hats and cycling bloomers; some of which are available for visitors to try on.

Figure 4.9 The Nursery Room (Ward 2009, Wolverhampton Culture, Arts & Heritage)

The Nursery Room represents Victorian childhood. It is a child friendly area, where visitors can play with replicas of toys and costumes from the period (Figure 4.9). One of the walls of the room has been turned into a mural with little doors and information about the town history seen from the point of view of a child. Additionally, there is a

replica of a school desk, books with traditional Victorian stories, colouring sheets, costumes and a dolls' house available to child visitors to play with. The Nursery Room also contains a large vitrine with a display of toys from the period.

4.2 RESULTS AND FINDINGS

The results of the observations carried out in Bantock House Museum are discussed in this section. Categories of data recorded are outlined, including: average time spent in the room and on communication around exhibition elements, non-evocative objects, verbal and non-verbal interaction between visitors. As a summary, the characteristics of an average child and adult visitor are presented.

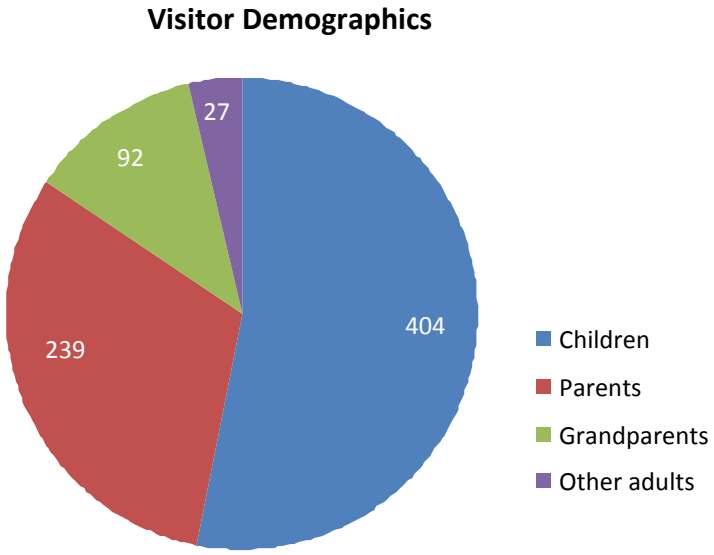

Figure 4.10 Numbers of visitors observed in the initial observations

A total of 213 family observations were made during the course of the spring half term and Easter holidays in April and May 2011. Each group observed comprised a family of 2 to 6 members. The observations were carried out in the seven rooms containing permanent exhibitions. Family members were categorised as follows: children, parents, grandparents and other adults. 53% of visitors observed (participants) were children (age: 0-17, 156 male and 248 female) and 47% adults (132 male and 226 female), of which two thirds were parents (Figure 4.10).

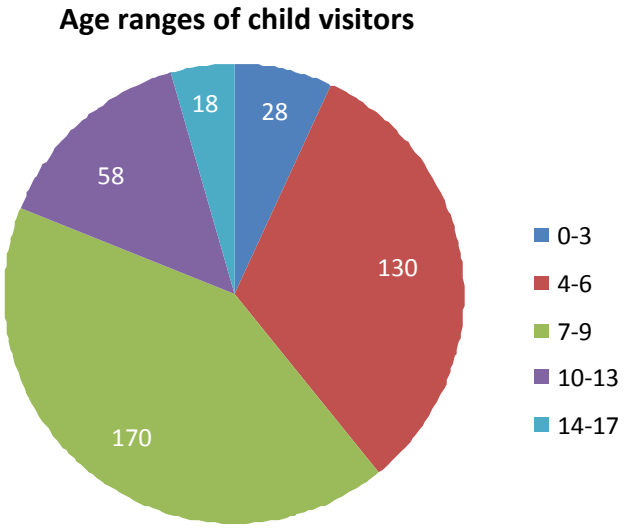

Figure 4.11 Age ranges of child visitors observed in the initial observations

The majority of child participants (73%) ranged in age from 4 to 9 years (Figure 4.11). The Victorian era is covered in the curriculum of primary schools for children in this age group. Teenagers (10 to 17 years old) constituted only 20% of child participants. 7 to 9 year olds are the current focus of Bantock House Museum. They were, therefore, taken as the main target group in the prototype development process.

The observations were carried out by the researcher and volunteers, who acted as silent observers, recording the group's actions and interactions onto a recording sheet. Most of the time, there were two people observing visitors; one on each floor. Each observer was equipped with a stopwatch to note accurate timing of visitors' interactions. The recording sheet was used as an aid to gathering information in a structured and consistent way (cf. Appendix § 8.1, p.199).

4.2.1 *TIME SPENT IN THE ROOMS*

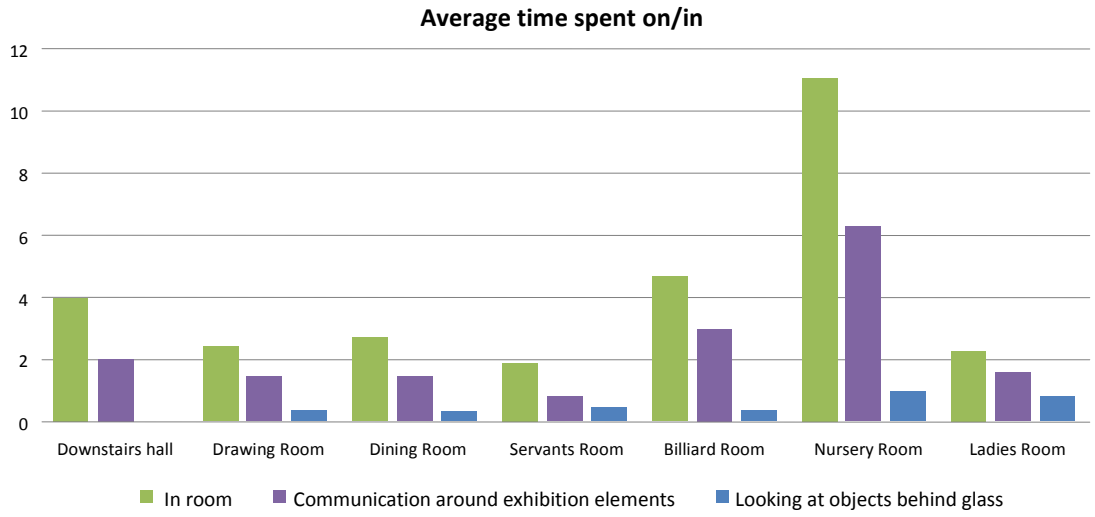

Figure 4.12 Average time spent by family in the observed rooms, on communicating around exhibition elements and looking at artefacts in vitrines (in minutes)

As depicted in Figure 4.12, families spent most time, on average, in the Nursery Room (11 min), the Billiard Room (4.5 min) and the Downstairs hall (4 min). The first two rooms, in addition to objects in vitrines, have various activities, including toys to play with, hands-on exhibits (drawers, mural, bottle game), colouring sheets and quizzes. The least time, on average 1.7 min, was spent in the Servants Room, which is a walk-through room leading to the Billiard Room. The following tendency was observed: with the exception of the Servants Room families spent half or more than half of their time communicating around exhibition elements, which included hands-on exhibits, objects in vitrines, and the interior of the rooms. Rooms with more multisensory stimuli, in particular the Billiard Room and the Nursery Room have a longer average stay and a correspondingly longer average communication time than those rooms with fewer stimuli, such as the Servants Room. These results suggest a correlation between stimuli available in the exhibition space and the occurrence of indictors of social dream spaces.

In regard to engagement with objects displayed behind glass; families examined these artefacts longest on average in the Nursery Room (56 sec) and the Ladies Room (47 sec)

and shortest in the Downstairs hall (0 sec) and the Dining Room (18 sec). It is worth noting that although there is a large display of Victorian toys behind glass in the Nursery Room, families spent only 8% of their time in this room looking at those objects. In the Ladies Room, displays behind glass fill most of the exhibition area and contain examples of Victorian bedroom interior (bed, dressing table), clothing (corsets, gloves, underwear), small objects (jewellery, trinkets and writing equipment) and japanned ware. Despite the predominance of objects behind glass in this room, the average time spent looking at these objects was 47 seconds, which is 9 seconds shorter than in the Nursery Room. The average time spent in the room was also relatively short at only 2.2 minutes. There appeared to be a general tendency that objects in vitrines were neglected and when no other activities or exhibition elements were available, time spent in the room was short. This does not confirm initial concerns that other elements on display compete with conventionally exhibited artefacts (cf. § 1.1, p.18) but does suggest that those elements are more evocative than artefacts in vitrines. The Downstairs hall contains only one showcase with objects, which, due to its placement in the wall, was often not noticed by visitors. The hall also differs from other rooms in that it has a video which can be played upon entering the room. The average time spent by families in the Downstairs hall area is approximately equal to the playing length of the video. This tallies well with the behaviour mainly observed in the Downstairs hall, particularly for first time visitors, namely, that they watched the video to the end, while flicking through available manuals, and then moved on to the next room as soon as the video had ended.

The analysis above shows that visitors displayed more indicators of contact with exhibition elements and other visitors where additional stimuli were provided. The initial assumption that objects exhibited in showcases are most frequently neglected by visitors was confirmed.

4.2.2 *VERBAL COMMUNICATION BETWEEN CHILD AND ADULT VISITORS*

In this study, verbal communication between visitors was observed and recorded as an indicator of engagement. Verbal communication was defined as conveying information through words and sounds. The analysis was driven by the following questions: How did visitors communicate with one another? How and what did visitors share in verbal communication?

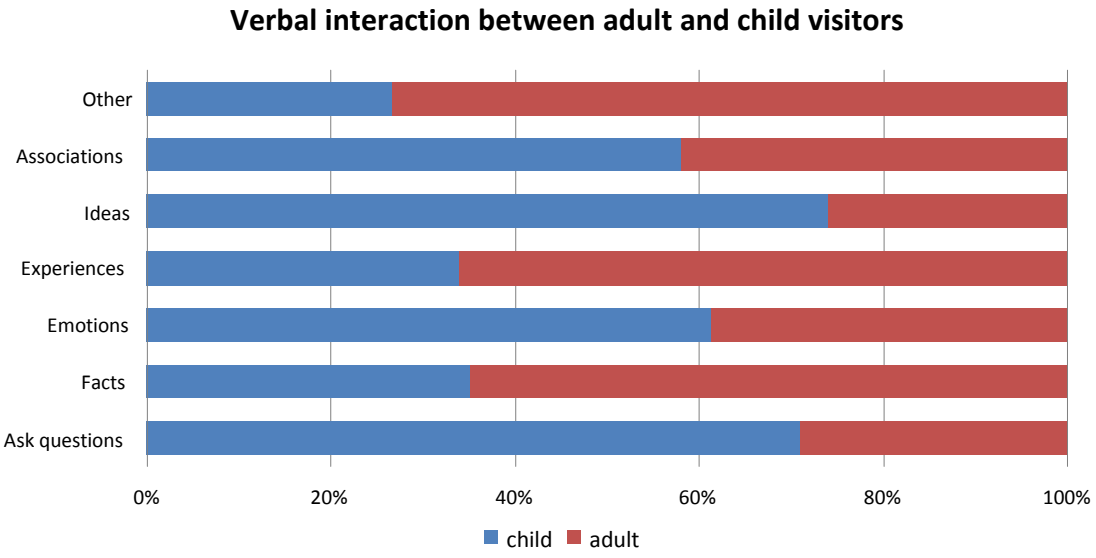

Figure 4.13 Verbal interaction between child and adult visitors (in % of visitors who communicated)

It became clear from the data gathered (Figure 4.13) that children and adults contributed different things to the verbal communication observed. Children (54% of visitors observed) constituted 71% of visitors who asked questions about the exhibition content, 75% of visitors who talked about their own ideas, 62% who expressed emotions and 58% who shared associations inspired by the exhibition space. Very often the exhibition space stimulated child visitors to engage in a spontaneous imaginary or pretend play (e.g. being a person from the Victorian era), which demonstrates verbal and non-verbal indicators of engagement with elements of the display. Adults (46% of visitors observed), on the other hand, constituted 65% of visitors who passed on historical facts, 66% who shared experiences and memories and 75% of those observed communicating in some other

way, e.g. reading aloud or sharing information from manuals and books available in the exhibition space. When they did ask questions, these were mostly leading questions to test the knowledge of accompanying children. When they expressed emotions, they tended to talk about their likes and dislikes towards the elements of display, comparing them with their own possessions. The differences between child and adult verbal interaction indicate that child visitors tended to share personal responses more frequently than adults. Children's contact with the exhibition space was based on emotions and imagination, whereas adults tended to concentrate on facts and knowledge.

Differences were also observed between the verbal communication of men and women. Mothers and grandmothers expressed their emotions more often than male family members. In larger mix-gender groups, women tended to lead the verbal communication with children, whereas men undertook the role of silent escort. It was also observed, that grandparents tended to share their memories and experiences with children more often than parents did. The social museum visitor roles described by Falk (2009, p.158) and Annis (1986, p.170) were clearly observable (cf. § 2.5.1, p.59).

The observations revealed that visitor behaviour varied consistently between different rooms. To illustrate these differences, the behaviours most commonly observed in the Nursery Room, the Ladies Room and the Drawing Room are outlined. In the Nursery Room, which presents tactile and kinaesthetic exhibits, such as toys and props, adults were observed sharing their experiences more than in other rooms in the museum. They explained to children how to use the toys available, and when they came across the dolls' house and school desk (Figure 4.14), they recalled their own toys and school days.

Figure 4.14 The school desk in the Nursery Room
(Ward 2012, Wolverhampton Culture, Arts & Heritage)

Child visitors tended to associate objects on display with their own experiences and recognised things, for example the costumes of children. Although the Nursery Room also contains a vitrine with Victorian toys, only a small number of child and adult visitors communicated around and about those artefacts. These results clearly illustrate that objects that can be physically touched tended to be more evocative than those behind glass (cf. § 2.2.1, p.36). The Ladies Room, in contrast, contains mainly objects in vitrines, mostly jewellery and japanned ware, and a bedroom interior that cannot be accessed by visitors. In this room, 90% of ideas communicated came from children. They were observed interpreting artefacts in an imaginative way. Children ascribed associations to unknown objects and generated their own ideas about how they could have been used, as for example in the following dialogue recorded between a grandmother and granddaughter (cf. Observation Sheet (OS) 193, DVD § 8.4.6):

Grandmother: Can you see the pot under the bed?

Girl: Yes.

Grandmother: What is it for?

Girl: For drinking tea!

The exhibition in the Ladies Room has only a small number of elements that may be physically touched. Visitors were observed communicating around objects that they could relate to or even imagine touching, e.g. the bed raised many comments about how uncomfortable it looked. In the Drawing Room, which is a mixed media display, the responses observed were closer to the average responses described above.

4.2.3 NON-VERBAL COMMUNICATION BETWEEN CHILD AND ADULT VISITORS

The observation of non-verbal communication between visitors was used to record indicators of contact, non-verbal indicators of engagement and to some extent verbal indicators of engagement, which are often intertwined with non-verbal interaction. In this study, non-verbal communication included non-word messages expressed by body language, gestures, facial expression and eye contact (Ekmann 1999, pp.45-55; Mehrabian 2007, pp.1-3; Knapp & Hall 2010, pp.8-10). The following questions were taken into consideration while analysing results: Was there any contact between visitors observed? How did visitors interact with elements of the display? What emotions did visitors express while interacting with the exhibition space and objects on display and how were these emotions expressed? What types of non-verbal communication existed between visitors and how did they manifest?

Child visitors were observed to communicate non-verbally only slightly more often than adults (Figure 4.15). The trigger of these non-verbal responses was, however, different for both parties. Child visitors tended to express their excitement or wonder about things on display by pointing at things, smiling and bringing family members to points of interest. This was often accompanied by verbal elucidation, e.g. “Wow! That’s cool!” Most adults,

on the other hand, only responded non-verbally to objects or parts of the exhibition which represented some kind of knowledge value to them. They also pointed out artefacts that children might know from their everyday life. Such non-verbal communication of adults was often supported by leading questions directed to children, such as "Do you know what it is?" or "Do you recognise that thing?"

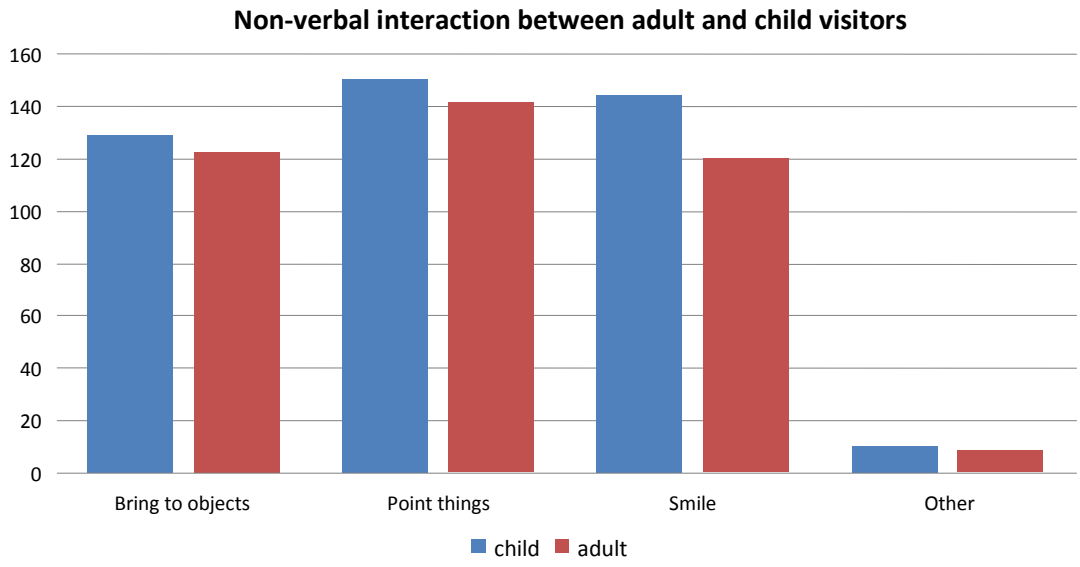

Figure 4.15 Non-verbal interaction between child and adult visitors (numbers of interactions observed)

Visitors were most non-verbally active in the Nursery Room and the Billiard Room. In the Nursery Room, which is based on kinaesthetic and hands-on activities, adults tended to take on the role of play facilitator, showing toys and props to children and demonstrating how to use them. The Billiard Room is based on free exploration of hands-on stations. In this room children or adults were not observed to take on any particular role in the non-verbal communication.

Adult visitors were more non-verbally active than children in three rooms of the seven observed: the Downstairs hall, the Drawing Room and the Ladies Room. In all those rooms adult visitors performed the role of leaders who plan, encourage and explain. The

Downstairs hall is an entrance area which serves as an orientation point for many visitors. Here adults led the group and planned their visit. They also often read museum manuals aloud to children. The Drawing Room was quite often the first room that the families visited in the Bantock House Museum. This may explain why children were observed to be rather reserved and uneasy. In the Ladies Room adult visitors tended to encourage children to enter the room and pointed things out that children might recognise. Child visitors observed in the Ladies Room were often distracted by voices of other children playing in the neighbouring Nursery Room.

The analysis of non-verbal communication shows that children were more spontaneous in their reactions than adults, who were observed to remain rather reserved. The more frequent indication of contact with exhibition elements does not necessarily mean that children engaged more with the exhibition, but does show children's eagerness to communicate non-verbally.

4.2.4 EVOCATIVE OBJECTS

One of the main goals of the initial observations was to locate objects that are naturally evocative and, by doing so, to determine which objects were not evocative (cf. § 2.2.1, p.36). During the observation of visitors, the following information was recorded: Which elements of the display drew the attention of visitors? How did visitors engage with elements of the display?

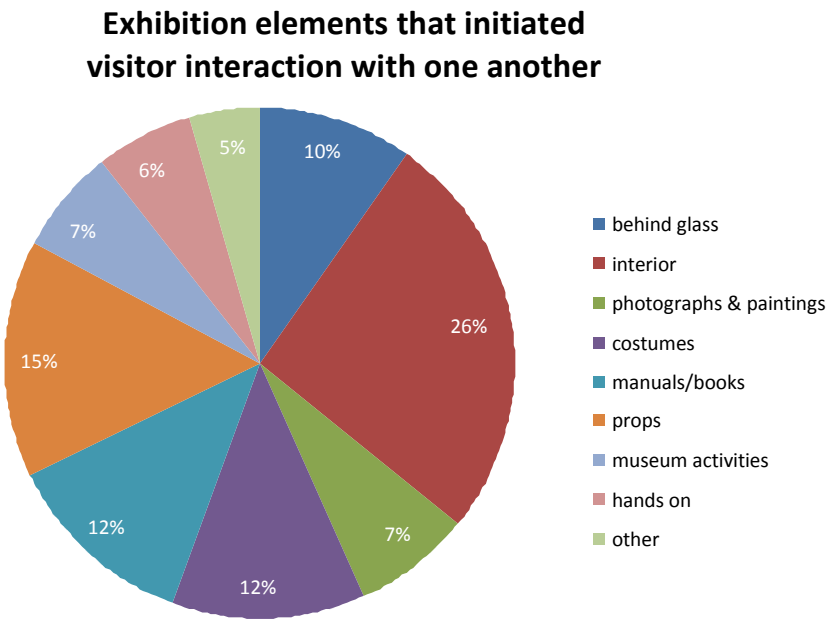

Figure 4.16 Elements of display around which visitors interacted with one another (in % of all evocations in whole museum)

On the whole, child and adult visitors tended to communicate mostly around the interior of Bantock House Museum including chairs, curtains, tables and lamps (Figure 4.16). Visitors are welcome to sit on all seating furniture and to touch all objects except the mannequins in the Servants Room. The possibility to touch an object physically was observed to be an important parameter in deciding how evocative an object is. During the observations, 26% of all visitor interactions were responses directly to the interior itself. 39% were responses to the costumes, manuals and props combined. This constitutes 65% of all communicative behaviours. In comparison, communicative responses to objects that could not be physically touched, which includes artefacts behind glass, paintings and photographs account for only 23%. These results are in line with previous research on children's museum experiences (Anderson *et al.* 2002, pp.221-222), where exhibits including kinaesthetic and/or tactile experiences as well as multisensory hands-on experimentation were recalled by children in great detail.

It should be noted that visitor responses differed according to the nature of the different rooms. Some rooms contain a higher proportion of objects behind glass, whereas others

have many more touchable objects. In the Nursery Room, for example, where the availability of tactile experiences is very high, the objects in showcases triggered responses from only 7,5% of visitor interactions, whereas in the Ladies Room they constituted 39% of visitor interactions (see DVD § 8.4.6). The importance of imagined touch is emphasised in the responses of visitors in the Ladies Room. Here child and adult visitors tended to communicate around objects that they imagined touching, e.g. the bed triggered more than one quarter of all verbal responses from visitors. Imagined touch was observed to play a role in fostering engagement with non-kinaesthetic and/or non-tactile museum objects and, therefore, was further explored through the prototype development (cf. §5, p.127).

4.2.5 CHARACTERISTICS OF CHILD AND ADULT VISITORS

Drawing on the results from the analysis of observations, the characteristics of adult and child visitors were formulated. These portrayals depict average museum visitors regarding their engagement with artefacts and their communication around them. The determination of the main features of visitors furthers the design process.

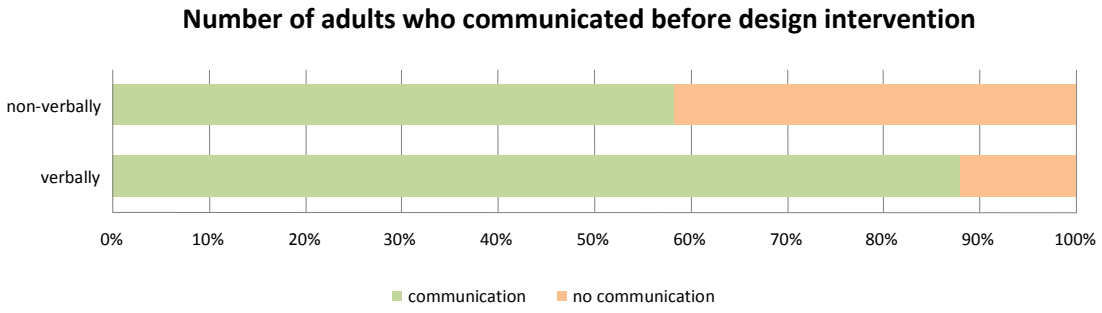

Figure 4.17 Comparison of verbal and non-verbal communication of adult visitors (in % of all adults observed)

Adults

The comparison of results suggests that the adults who were observed tended to communicate verbally rather than non-verbally (Figure 4.17), mainly by passing on facts

and giving explanations. They often shared their experiences and memories of the past (especially the grandparents). Their role can be described as that of teacher, guide, explainer and facilitator of the children's experience. Adults in general spent more time observing manuals, objects behind glass and paintings than children. In contact with kinaesthetic or tactile exhibits adult visitors tended to let the children take the lead. As a rule, they did not play themselves, and when they did touch elements of exhibition this was mostly as a means of explaining them to younger members of the family group. Compared with children, adults spent less time with costumes and toys, whereas hands-on exhibits were used by both groups equally often.

Four types of adult behaviour during play were observed:

- Observer – The behaviour of non-interference in children's play was the most common. Adult observers sat down and observed their children playing. They sometimes engaged with some other activity such as reading available manuals or playing with their mobile phone.
- Facilitator – Here adults took on the role of child's play helper (explaining rules, giving instructions and taking care of personal belongings), but they themselves did not to get involved in the play.
- Lone player – This type of behaviour was mostly observed for male adults, who played on their own with the available toys while the child was playing with something else. Lone players tended not to like sharing toys or play processes with their children.
- Equal player – Adult visitors very seldom played with children as equals.

Children

The analysis of the observation results shows that, on the whole, children were more communicative than adults. They asked twice as many questions and expressed emotions much more often than adult visitors. Children expressed their wonder, astonishment, fear

and disgust in verbal and non-verbal ways. This characterises them as explorers, discoverers and learners.

The results obtained suggest that child visitors showed only slightly less interest in museum objects than adults. The nature of their engagement was, however, different. Adults showed interest in the content of vitrines, whereas children tended to look at objects behind glass only when adults drew their attention to them. Physical touch was observed to be a significant factor in children's engagement with exhibition content. The most attractive elements were tactile or kinaesthetic objects, such as drawers, toys, hand-on exhibits and costumes. Costumes also held the children's interest. Children were observed interacting with the real garment and engaging in pretend or fantasy based play. Example: A situation recorded with a mother and her son in the Billiard Room (cf. OS 136, DVD § 8.4.6). The boy plays cards while wearing the costume. Mother takes photographs of him. The boy smiles and says: "Look Mum! I'm Scrooge!"

4.3 ANALYSIS OF ADDITIONAL SOURCES OF DATA

In addition to observations, data were gathered through non-verbal tools, notebooks and cameras. These supplementing datasets are discussed below.

4.3.1 THE NOTEBOOKS: ANALYSIS

Notebooks were given to children in the entrance area of the museum. They were designed to enable them to reflect on their visit to the museum and express themselves in pictures and/or writing. The coded data from the analysis of the notebooks as well as an example of a completed notebook are included in Appendix, DVD § 8.4.2 & 8.4.3.

97 children aged 6 to 13 were asked to fill in the notebooks. Younger children were helped by adults mostly in writing (adult – reads and writes; child – answers, tells stories, draws pictures). While explaining the purpose of the notebooks to the parents, the

importance of noting only children's views, as they were the focus of the study, was emphasised. After the first week of launching the notebooks, it was noticed that some notebooks were coming back only half filled in. A short investigation suggested that some of the families did not have enough time to fill the notebooks in and they were not eager to take notebooks home with them and post them back. For that reason, some notebook pages were copied on A4 sheets and put on the colouring table in the Nursery Room to gather additional data.

Attitude towards museum

Children's responses confirmed an overall positive attitude towards the museum (84% of all responses). To describe their feelings about Bantock House Museum children used words such as excited, amazed, impressed and happy.

Figure 4.18 A map of participant's favourite room: the Nursery Room (Child participant 2011)

According to children's responses, the rooms in which visitors spent most of their time were the children's favourites. The Nursery Room (Figure 4.18, p.111) was the favourite room of 51% of children who expressed a preference, the Billiard Room of 17% and the Ladies Room of 12%. The Dining and Drawing Room were favourite rooms of c. 6% of children each. The rooms least often mentioned as favourites were the Downstairs hall and the Servants Room. When asked why children liked the Nursery Room, their answers indicated that they felt welcomed in the space ("I'm a child and that's a child's room"). They also mentioned toys, fun and the possibility to play as important features of this room.

Figure 4.19 Images of toys as favourite objects (Child participants 2011)

Physically touchable elements of display were most often identified by children as their favourite object (69% of all responses). Toys were the favourite objects of 41% of children who responded (Figure 4.19), interiors (including furniture, mural, window seats) of 15% of children and props (including costumes) of 11%. Objects in vitrines were mentioned by 13% of children, which confirms results of observations (cf. § 4.2.4, p.106).

Figure 4.20 The dolls' house from the Nursery Room (Child participant 2011)

The object most often mentioned was the dolls' house (12 times), which is displayed in the Nursery Room (Figure 4.20). Children mentioned that "it's elaborate", "looks like Bantock House", "shows life in the past and you can play it". Some of them expressed a wish to own a dolls' house like this one. Children also said that they liked old toys, the suit of armour, the billiards table and dressing up.

Similar results were obtained when asked about things that made children happy. 46% of responses were about a particular element of the display, of which props constituted 37%, interior 27% and statues and mannequins 16%. The objects behind glass were mentioned by only 7% of children. Other things that evoked positive feelings in child visitors were a particular room (28%, including most responses about the Nursery Room) and a particular activity (21%, including dressing up the most).

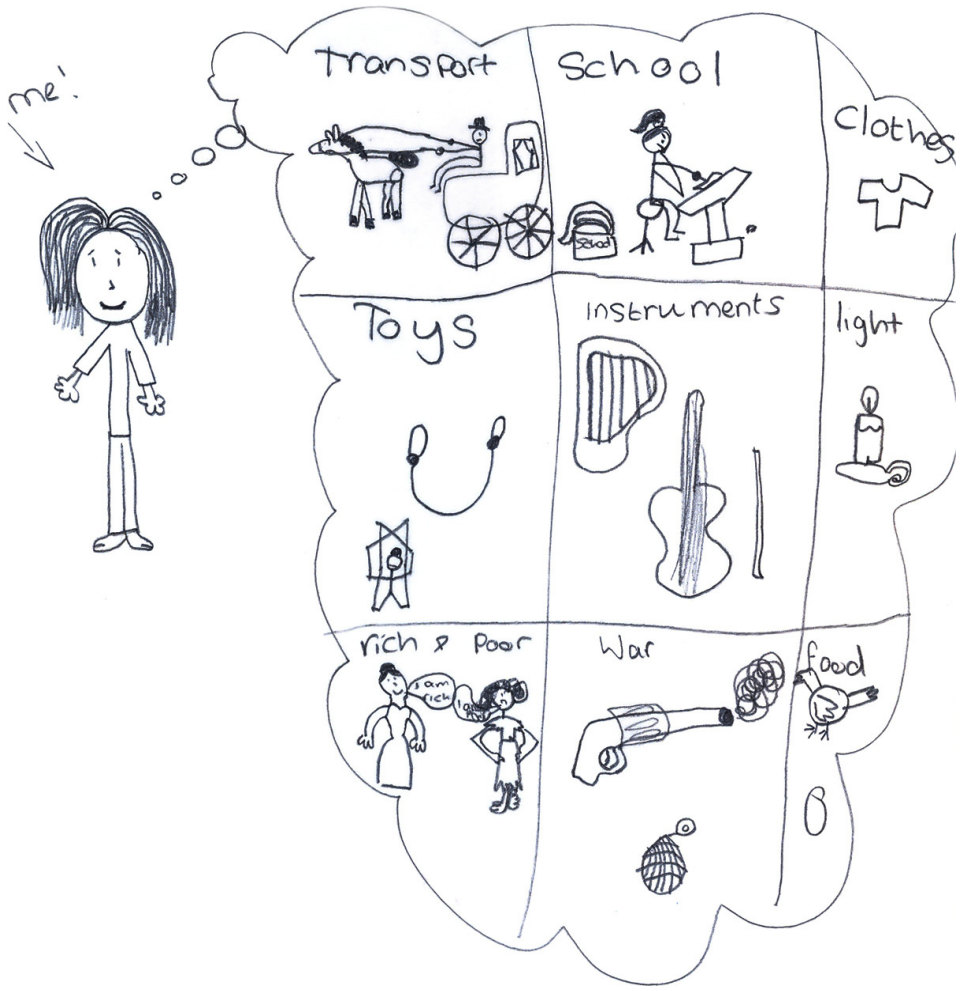

Figure 4.21 Participant's response to the task:
"This is what the museum made me think of today" (Child participant 2011)

When asked about the thing the museum made them remember, 33% of children who responded pointed out a particular object or a place in the museum, for example the lifeboat models that were on display in the Community Gallery. 26% of children mentioned the historical past (life, people and things) (Figure 4.21). The most popular answer was "the olden days". 15% were reminded about their own past, and 14% remembered a particular fact from the past, such as the visit of Queen Victoria to Wolverhampton or the number of children who had lived in Bantock House. It is worth noting, that responses to the task "This is what the museum made me think today" were similar to answers about remembering. Here, however, children also mentioned particular feelings connected to their museum visit (happy, excited, interested, etc.) as well as imagining themselves being a child from the past.

The children were also given the possibility to share ideas on how the museum can be changed for the better. It occurred that 38% of children who responded would not change anything, 24% of children wished for more activities in the exhibition space and 22% would like to change a particular object or space. Most often mentioned were the squeaky floor and the Ladies Room. Some children explicitly pointed out the ground floor rooms of the museum as an area for improvement ("make it better", "make it more exciting, full of things to touch and explore"), which was taken into account while choosing the space for the prototype implementation (cf. § 5.2.1, p.142).

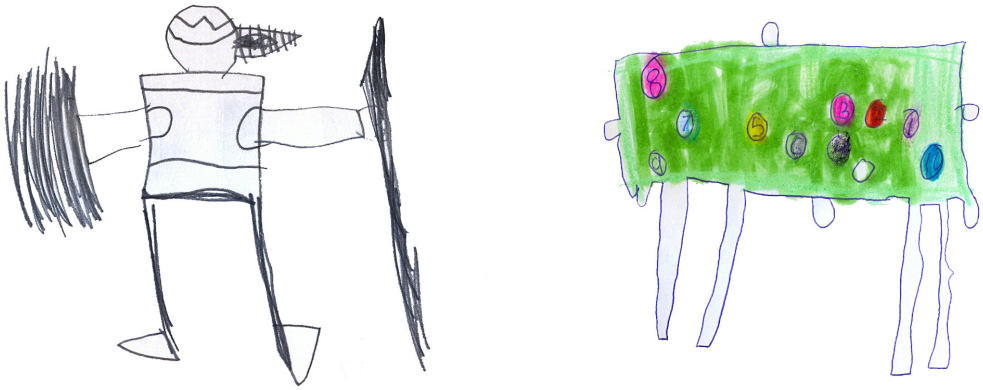

Figure 4.22 Suit of armour and billiards table as examples of favourite elements of the display (Child participants 2011)

This analysis suggests that physical contact has a role in influencing children's experience of museum objects. Elements of the display that can be touched were recalled more often than those in showcases. The interest expressed in interiors indicates immersion as a potent component of a museum visit. Children were observed identifying themselves as potential residents of the house and imagined living in the house, which in turn indicate internal engagement with the museum space. The large objects, such as the billiards table and the suit of armour (Figure 4.22), were recalled by children more often than other artefacts. This confirms previous research (Anderson *et al.* 2002, p.221) carried out on children's museum experience, which found that large scale exhibits are readily recalled by children in museum settings.

4.3.2 *THE CAMERAS: ANALYSIS*

Children were asked to use disposable cameras to take photographs of things and places they liked most in Bantock House Museum. They were given no extra brief and were left alone to do whatever they found appropriate. Fourteen children aged 6 to 12 took part in this part of the research. This includes four pairs of siblings who expressed the desire to do the task together. Children were happy to get involved in the project, feeling an important part of a museum development scheme. They took cameras as their own and seldom allowed other members of the family to use them. The material gathered can be only partly published in this study, due to identity protection requirements.

Broad subject matter

There are several broad subject matters that were identified in the photographs taken by children. Most of these are in line with the results of observations and notebooks analysis.

1) Display elements

Figure 4.23 Photographs of elements on display (Child participants 2011)

The majority of photographs taken depict the interior of Bantock House Museum, which tallies well with the observations analysis (cf. § 4.2.4, p.106). This includes such elements as the copper fire place and statue of a golden angel in the Downstairs hall area, mannequins of Servants in the first floor, the billiard table, and the dress in the Ladies Room (Figure 4.23). All of the children took photographs of one object, namely the dolls'

Figure 4.24 Interior and exterior views of dolls' house (Child participants 2011)

house from the Nursery Room. The pictures show the dolls' house from several angles and views, including details of its interior (Figure 4.24). Children also were photographed while playing with the dolls' house or standing next to it in Victorian costume.

2) Objects in vitrines

Figure 4.25 Photographs of objects in vitrines (Child participants 2011)

Children took photographs of objects in vitrines, which show a diversity of interests, including large and small objects. Most of the artefacts were photographed in a general view, within a group of objects. Subjects repeatedly identified are: the clock in the Downstairs hall, china plates in the Drawing Room, toys in the Nursery Room, the bed and trinkets in the Ladies Room (Figure 4.25).

3) The museum space

The room most often photographed was the Nursery Room, where children often took several pictures of general views as well as details of the display, such as the mouse hole, toys in drawers, pictures on the mural, costumes and the dolls' house (Figure 4.26). Worth noting is that almost all children took photographs of window views, mostly from the top floor down to the museum courtyard.

Figure 4.26 Details of the Nursery Room (Child participant 2011)

4) Members of the family

Children took pictures of their carers, alone or with them together. Often these photographs include the family members interacting with the exhibition space for example reading manuals, looking at statues or wearing costumes.

The angle and composition

Most of the photographs were taken from the eye level and the perspective of a child. The photographs are often centred with a general view on a group of objects. Large objects were photographed in frog perspective.

To summarise, the results of the analysis of photographs taken by child visitors show that children were interested in various subject matters, with a preference for large and tactile elements of the display. The frequent depiction of the Nursery Room tallies with notebook

responses, where its friendly and child-orientated atmosphere was emphasised (cf. § 4.3.1, p.110). This suggests that the open, welcoming ambience of the exhibition space can positively influence children's responses. The photographs of family members emphasise the importance of the social context of a museum visit.

4.4 TRENDS IN FAMILY GROUP COMMUNICATION

In light of the research carried out, the following broad trends were identified as typical for the family groups observed.

Some family groups observed did not communicate verbally while visiting museum rooms. They remained silent observers of the museum space. Additionally, children who did talk to one another were often asked to keep silent, not to touch objects and not to play around in the museum. In areas designated to children, however, child visitors explored the environment with interest and excitement. Most adults did not assist those endeavours. They were observed sitting or standing aside and observing their children playing.

When members of a family group looked at objects displayed in vitrines, it was more often adults than children. Children tended to engage more with objects and display elements that could be physically touched or moved. Some objects on display may be regarded as naturally social (Simon 2010, § 4) as they triggered interaction between child and adult visitors before any intervention. Objects, such as the suit of armour, Victorian costumes or the billiard table, drew the attention of visitors and became the starting point for social interaction between them (cf. § 2.2.2, p.36). They evoked comments ('Oh I like it!'), feelings (smiles and sounds of wonder and admiration) and actions (taking photographs, drawing the objects).

Some family groups were observed to neglect all the museum rooms except the Nursery Room, where they spent a significant amount of time. This was associated by the museum workers with the bad weather and the resultant lack of possibility to use the outdoor playground.

The trends described above were taken forward as aids for designing the prototype of a digitally enhanced space.

4.5 SUMMARY OF STAGE 1

In the first stage of empirical part of this research, visitors were observed in the museum context in order to determine the occurrence of indicators of social dream spaces and locate problem zones that were to be addressed in the subsequent design intervention. The systematic study, based mainly on in-gallery observations, used the four categories of indicators of social dream spaces (cf. § 3.1, p.65) as a framework for data gathering and analysis: internal, non-verbal and verbal indicators of engagement and indicators of contact.

The results of the analysis suggest that indicators of social dream spaces were frequent in some exhibition areas. The indicators of contact were observed mostly in the rooms based on hands-on, tactile exhibits such as the Nursery Room and Billiard Room. Moreover, more time was spent in these rooms than in rooms with fewer tactile elements. For example, in the Nursery Room, families spent on average 11 minutes of which half the time was spent on communicating around exhibition elements (cf. Figure 4.12, p.99). In the Drawing Room, by comparison, families spent on average 2.4 minutes of which 1.4 minutes was spent on communicating around exhibition elements and only 33 seconds spent looking at objects in vitrines.

Figure 4.27 The dolls' house in the Nursery Room (Child participant 2011)

The analysis of notebooks and photographs taken by child visitors demonstrates internal indicators of engagement. For example, one of the most often photographed objects on display was the dolls' house in the Nursery Room (Figure 4.27). Some notebook responses suggested that children imagined themselves being residents of the house or even characters from the Victorian era.

Figure 4.28 Mannequins of servants (Ward 2009, Wolverhampton Culture, Arts & Heritage)

Non-verbal and verbal indicators of engagement were mostly observed together. For example in the Billiard Room, where visitors tended to bring one another to the costumes of Victorian gentlemen (hats and coats), try them on, pretend to be a person from the era, take photographs of one another and laugh. Strong emotional reactions were evoked by the mannequins in the Servants Room (Figure 4.28). Visitors communicated with one

another by pointing the figures out and talking about their scary look, as for example in the following dialogue (cf. OS 19, DVD § 8.4.6):

Mother: Imagine what they do at night...

Girl: Oh, I wouldn't like to meet them!

Some elements of the exhibition were observed to trigger reactions based on imaginative thinking, such as for example, a desk in the Nursery Room, where one family group played school with grandmother being a teacher and a girl a pupil (cf. OS 176 DVD § 8.4.6). On another occasion, a boy sat at the desk and pretended to be a boss: "Hello people! That's me! Grumble Tramble!" (cf. OS 155, DVD § 8.4.6).

The analysis of the data gathered also allowed areas of infrequent occurrence of indicators of social dream spaces to be located. Low occurrence of the indicators of contact was observed around objects displayed in vitrines. The contact between visitors was low in some family groups, especially those who had spent little time in the rooms (walk in and out). Most adults, if they communicated, concentrated on passing on facts rather than personal experiences or emotions. In the case of the ground floor rooms (the Dining Room and the Drawing Room) visitors were never observed to come back, and sometimes even neglected these spaces altogether, heading straight to the upstairs rooms. Non-verbal and verbal indicators of engagement were sometimes not observed in the case of family groups where adults told their children to remain silent and not to touch anything on display, even though museum workers invited them to do so.

The analysis of data according to the characteristics and indicators of the social dream spaces led to the formulation of the following key points. Social dream spaces occur when there is contact with the object and visitors engage with them. Certain elements of the exhibition, however, tended to be neglected by visitors, especially objects in showcases. Artefacts that can be physically touched were observed to be more evocative than those where physical contact was impaired. Social dream spaces are also indicated when

engagement with objects is communicated to other viewers and leads to engagement by other viewers. Visitors tended to interact with one another more often and to spend more time on those interactions in the spaces where open-ended exploration was enabled. Children communicated their experiences (verbally and non-verbally) more spontaneously than adults, who were observed to dispense more factual information than personal or emotional responses. Additionally, adult visitors were observed not to engage in play, but rather observe or facilitate it.

4.5.1 DESIGN BRIEF

The information gathered during initial observations was sorted according to questions formulated based upon the indicators of social dream spaces (cf. § 3.5.2, p.84). This allowed the outcomes of the research analysis to be compared with the theoretical framework of the Social Dream Spaces Model and its indicators. Based on this evaluation, the following design goals were identified:

- To bring the attention of child visitors to objects behind glass.

By definition, social dream spaces can be initiated only through contact with objects (cf. § 2.5.3, p.63). In this study, objects are artefacts displayed in showcases. As the analysis of the results from initial observation show, those objects were not as evocative to child visitors as the tactile elements of the exhibition, such as furniture or hands-on exhibits.

- To not compete with objects on display

Interviews with museum workers raised concerns that additional digital elements in the exhibition space might act as competition to objects. Data analysis, however, did not confirm any adverse effect on visitors' engagement with objects due to additional elements already present in the exhibition, including toys, hands-on exhibits, videos and costumes. This suggests the possibility, at least, that digital enhancement can be designed which does not overly compete with objects on display.

- To enhance non-physical contact with objects in vitrines.

During observations visitors were engaged mainly with objects that can be physically touched, e.g. costumes in the Billiard Room (cf. § 4.2.4, p.106). As physical contact is not possible with objects displayed in showcases, non-physical alternatives were sought.

- To facilitate open-ended exploration of the exhibition space.

The literature review showed that open-endedness of exhibition spaces is a feature that enables process-focussed and participant-driven activities (cf. § 2.4, p.44). Results of the analysis concur with this assertion (cf. §§ 4.2.2-4.2.3); visitors engaged more with the exhibition spaces where free exploration was enabled (e.g. in the Nursery Room).

- To empower the child within a family group.

The analysis of data gathered indicate more frequent occurrence of internal, non-verbal and verbal indicators of engagement by children than adults, who concentrated mainly on passing on knowledge (cf. § 4.2.5, p.108). Adults, however, were observed to respond more personally to children's remarks. In order to trigger more of such interactions, it was decided to address the design of digital enhancement to child visitors. This, in turn, would also bring balance into the existing exhibition, which was developed with only adults in mind.

- To support adults in their role as teacher, but also encourage them to take on the role of equal play partner.

As the indicators of engagement were observed less frequently in the case of adult visitors (cf. § 4.2.5, p.108), especially in the child-orientated spaces such as the Nursery Room, it was decided that the redesigned space has to encourage adults to share not only their knowledge but also to communicate more personal responses based on imagination and emotions.

The design intervention was developed based on these design goals in order to improve visitor-object engagement in areas where indicators of social dream spaces were infrequent. In addition, there were several design constrains that originate from site specific characteristics of the museum, its goals and policy. Each of these is considered in turn:

- Technical constraints: it was important not to make any permanent changes to the physical environment of the museum. All technology was, for that reason, mounted with removable materials such as Velcro and masking tape.
- Conservation constraints: the required protection of museum artefacts limited the permitted usage of media, such as light and sound, in order to avoid damage to historical objects.

Details of the development of the prototype space and its implementation into the existing exhibition are presented in the next chapter.

5 STAGE 2: THE DESIGN INTERVENTION

This chapter presents the development of the concept of a digital enhancement that was used to determine how a space created with the Social Dream Spaces Model in mind (cf. §§ 2.5.3 & 3.1) can effect a change in visitors' engagement with museum objects. The concept is based on the design brief that was formulated according to the analysis of data gathered in the initial observations and other data sources (cf. § 4, p.89). The prototype supplemented an existing exhibition space. The results of observations of its usage by visitors are presented and analysed in chapter 6.

5.1 DESIGN CONCEPT OF A DIGITALLY ENHANCED EXHIBITION SPACE

The design brief states that digital enhancement must not compete with objects on display. It was decided, therefore, that digital elements should be designed to be as non-intrusive as possible (cf. § 5.1.1, p.128). In order to fit the homely ambience of Bantock House Museum, subtle solutions were chosen as opposed to more incongruent solutions such as computer screens and touch tables. In the design brief, the need to facilitate non-physical contact with artefacts is outlined. Analysis of the data collected during observations suggested the importance of imagined touch in children's engagement with objects, as for example in the case of the bed scene in the Ladies Room where visitors imagined themselves lying on the bed or using the bed paraphernalia (cf. § 4.2.4, p.106). The fostering of imagined touch was, therefore, identified as one means to enhance non-physical contact with artefacts in showcases. The design brief also sets out the goal of empowering the child within a family group. To that end, the design focussed on the characteristics of children (ages, heights, prior knowledge and experiences) and also encouraged intergenerational interaction between family members, so that the unique characteristics of children become a benefit to the entire group and not a barrier between generations. In order to support communication, the redesigned space had to be

multisensory, multimodal and accessible for multiple users at the same time (Donnelly & Power 2007, p.27).

These parameters, in conjunction with the design brief (cf. § 4.5.1, p.123), constitute the basis of the concept development presented below which includes theme considerations, structure, content and design details.

5.1.1 PROPOSED THEMES – TOWARDS NON-INTRUSIVE INTERVENTIONS

Early design concepts were explored through brainstorming and sketches, as well as tested against the theoretical bases of the Social Dream Spaces Model.

Concept 1: Hand-held device

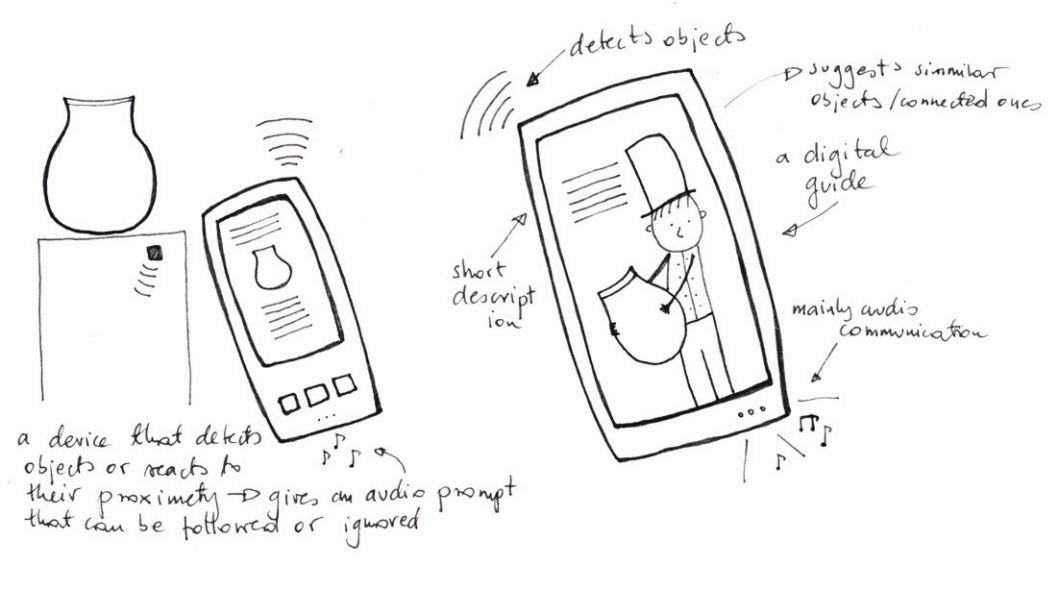

Figure 5.1 Sketch of a hand-held guide

One early idea for a main theme of the design concept was based on the notion of a digital storyteller that would serve as a guide and facilitator of museum explorations. This was inspired mainly by the in-gallery observations, where museum workers communicated with visitors about the objects, especially ones such as japanned ware, glass vases or decorated china, which were seldom noticed by the visitors. It was observed that, by

telling stories and pointing out details, museum workers created wonder around neglected objects. As it is not possible to have museum workers available to visitors all the time, it initially seemed logical to use digital elements to help supplement them. One concept considered was a hand-held tool that would have the same qualities as a museum guide: a personal, enthusiastic and knowledgeable storyteller (Figure 5.1). After further observations and reflections, it became clear that such a device would build a barrier between visitor and artefact. It would be a bridge between both of them, but would not allow the full development of social dream spaces that are personal and intimate. For that reason, it was decided that the digital facilitator would be counterproductive and that the objects should speak for themselves.

Concept 2: Augmented hats-game

It was observed that child visitors often engaged with costumes on display, especially hats. This became the starting point for the development of a game concept (Figure 5.2, p.130). A set of Victorian hats would be available to child visitors in the entrance area of the museum. RFID tags could be used to enable interactions and can be placed relatively seamlessly inside of the hats. From the point of view of users, each person wearing a hat would set off different actions, for example sounds or lights. Some actions may be triggered by more than one person. Children would become leaders of interaction with the exhibition space, attracting the attention of other family members. No one person could trigger all events. In this way, a group, whose members interact with one another, would have a richer experience than individuals exploring the exhibition space alone.

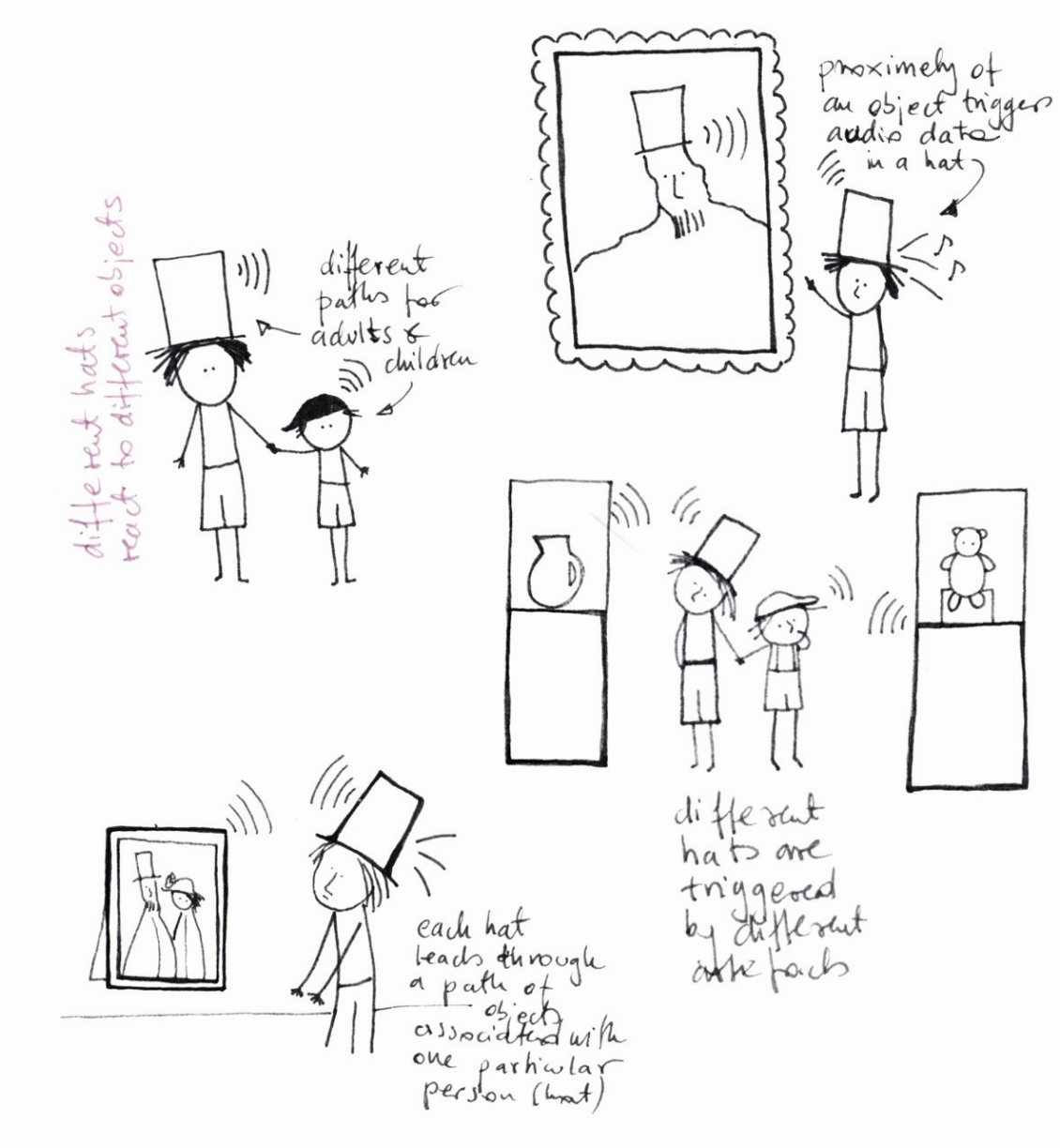

Figure 5.2 Sketch of the augmented hats game

Bantock House, before it became a museum, had been the home of the Bantock family. In order to bring the characters of the family members to life, each hat that triggers interactions would be ascribed to one of the house residents. Thus, the hats would allow visitors to slip into the character of a different person and to see the exhibition from a different perspective (Figure 5.3, p.132). The hats would not draw specific paths, but would rather act as keys that open different doors. Organising triggered events according

to hats would enable multiple users to play together and discover things for one another at the same time. This would be most important for family groups with more than one child. The division would provide visitors with several possibilities to choose from, i.e. returning visitors could choose a different hat each time and see the exhibition from a different perspective. Such a structure would also be easier to update and redesign by museum workers.

At first, the concept of a game seemed to fit well with the initial goals of engaging visitors with objects on display and incorporating their characteristics (height, prior knowledge) into the design. The concept was, therefore, further explored and in its basic design contained five characters: Mr Bantock, Mrs Bantock, George the Gardener, Minnie the Maid and Alberta the Child. In the future, the museum could add new characters to the basic set and redesign existing characters according to need or season. In addition to events that would be connected to specific characters, there would also be extra events that could be discovered by anybody wearing a hat. The hat concept was developed with children in mind. To engage adult visitors fully, RFID tags could also be prepared to create a special path for adults that complements the child's one.

The hat concept was developed to the point where the first prototype could be tested in the lab. It was determined that the long range RFID tags available were not sufficient to trigger interactions without significantly altering the behaviour of visitors. In addition, the game itself, although it does not have any specified goal, is still a task-orientated solution, which could have disturbed the initiation of personal contact with objects and engagement with them (cf. 'Passport to the Afterlife' & 'Ghost of a Chance' in § 2.4.1, p. 46). The failure of the first prototype of the hats concept clearly demonstrated that a more object-centred and subtle intervention was needed for the investigation of the Social Dream Spaces Model. Although, for these reasons, the hats game was ultimately

discarded, many elements from this concept, e.g. the butterfly animation and the idea of triggered events, were incorporated into subsequent designs.

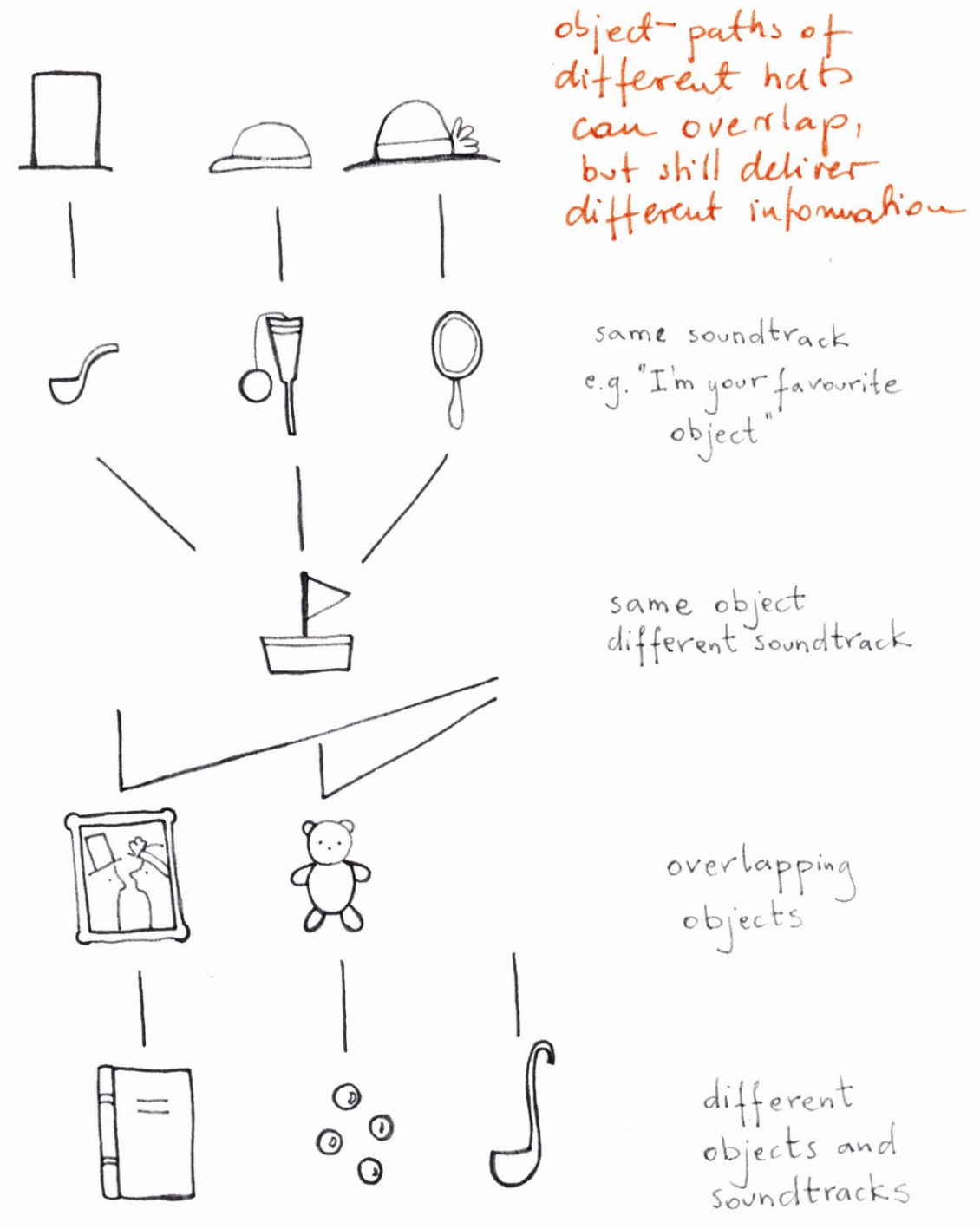

Figure 5.3 Sketch to augmented hats game: Each hat leads visitors from object to object. Artefacts ascribed to different hats may overlap but deliver different information about them

Concept 3: Micro spaces

The final concept explored was based on the idea of objects as storytellers. In this concept, digital technology, when used, should only play the role of amplifier that strengthens the voices of artefacts. Instead of creating a digital element which is independent to the objects, technology should be used to enhance the object itself (Figure 5.4).

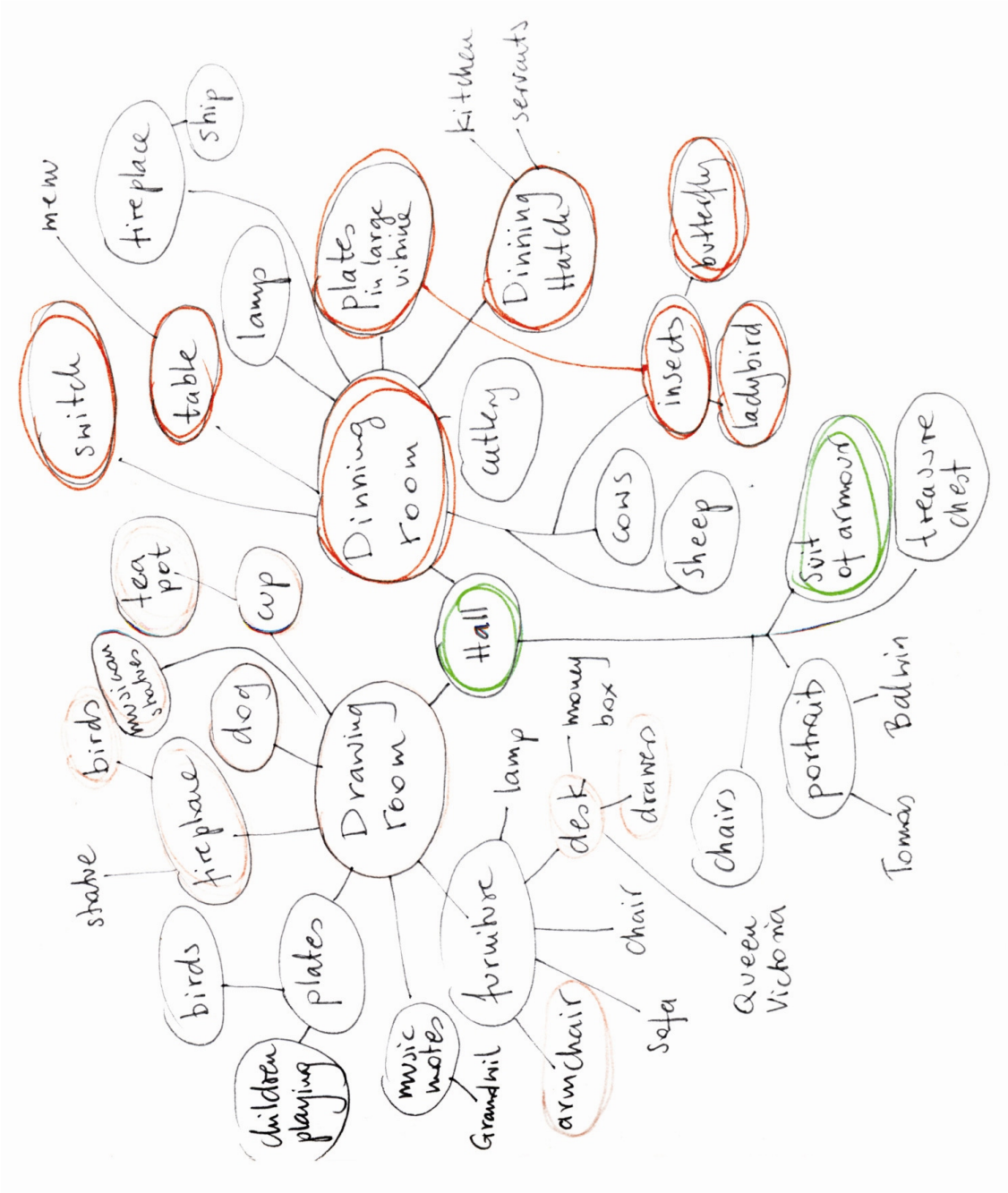

Figure 5.4 A sketch from a brainstorming session with museum workers showing a list of objects suitable for digital enhancement through micro spaces

Thinking about the exhibition space as a whole, where all elements influence one another, it was important to create a digital enhancement of this space that would not stand in competition to other exhibition elements, but would complement them. This led to the decision to create a series of micro spaces around museum objects, rather than an additional interactive installation or digital handheld device. Each micro space enhances an artefact or a group of artefacts. These micro spaces can be discovered and entered by visitors. Visitors who are not interested in the micro spaces can simply ignore them without adversely influencing the typical museum experience.

Each of the ideas above was discussed with museum workers and evaluated. The micro spaces concept was chosen to be further investigated as it fitted best both the goals of the museum (to make the exhibition area more entertaining for young visitors) and the research goal (to enhance neglected artefacts, foster contact with objects and test the Social Dream Spaces Model in use).

Even though the micro spaces were considered as support for separate objects in the museum, they were connected into one theme that can be entered from different points and explored in an open-ended manner. By doing so, the micro spaces were integrated into one dramatic whole without a rigid script. The theme chosen was the 'Magic House'. The aim was to create a space where at any time anything can move or talk to visitors. Similar to the fictional Hogwarts School of Witchcraft and Wizardry depicted in the Harry Potter books (Rowling 1997-2007), the museum was to be full of animated objects of wonder. This theme matches the original atmosphere of Bantock House Museum, which, according to notebook responses, evoked child visitors' imagination about life in the past. The museum's collection consists of highly decorative artefacts and interiors as well as objects that were used in daily life. In informal interviews, carried out at the beginning of the study, museum volunteers likened the house to a frozen world that waited to be

awakened. By creating the digitally enhanced spaces around museum objects, the intention was to bring objects to life.

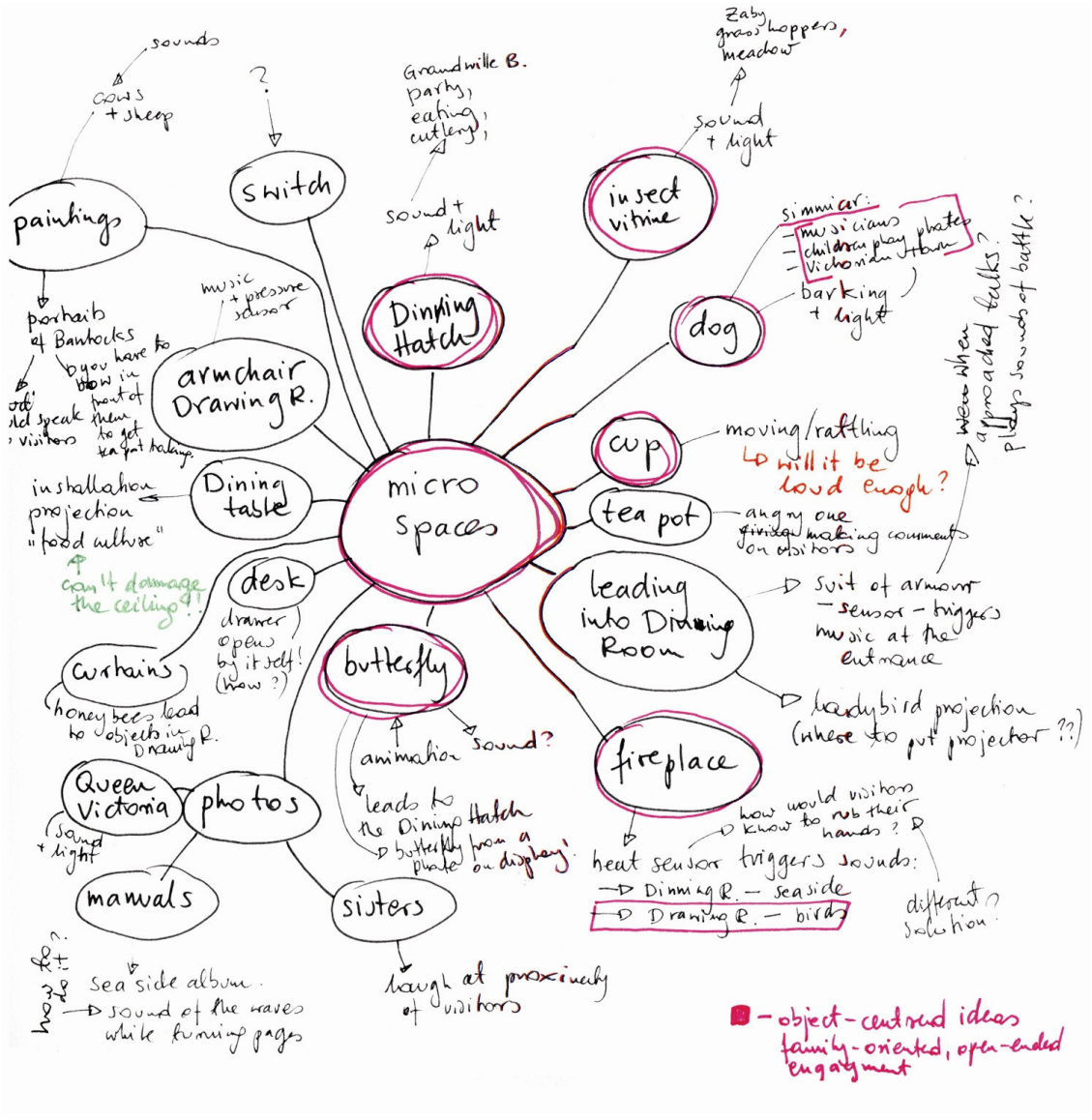

Figure 5.5 A sketch from a brainstorming session on micro spaces conducted with museum workers

Several brainstorming sessions were conducted with museum workers in order to explore the possibilities of various micro spaces (Figure 5.5). These sessions often took place in the gallery space, where museum staff walked the researcher through the exhibition space and shared their knowledge and engagements with artefacts. This led to engagement by the designer-researcher and the development of new ideas. The conversations were mutually inspiring for both museum staff and the designer and all

generated concepts were recorded and filtered according to their compatibility with the goals of the design brief. A catalogue of rough ideas is presented below.

5.1.2 MICRO SPACES: IDEA DEVELOPMENT

The ideas generated during brainstorming sessions with museum staff can be divided into two categories: 1. Those based on a particular element of the display, often using characteristics of the object to make it seem alive to the visitors; 2.Those that are aimed primarily to encourage visitors to become more active in the exhibition space. All ideas generated were recorded by the designer, further developed with sketches (Figures 5.6-5.8, below) and evaluated according to their suitability to the design brief. Key ideas are presented below according to the categories.

Artefact-based micro spaces:

- A photograph of the Bantock sisters stands on a side table of the Dining Room. When visitors come near the table, a sound of girls' laughing would be triggered in order to attract their attention.
- The large oak table in the Dining Room could be a projection surface for an interactive installation presenting a sample menu of Bantock family meals. The installation could change according to the time of the day, offering different menus to different visitors. This could also be developed into a game.
- Selected objects could be animated and give comments on what is happening in the room or react to visitors. For instance, an animated butterfly triggered by a presence of visitors could fly through the room and sit on a teapot displayed in the Drawing Room. The teapot could then say "Get off me!" and shake in order to get rid of the butterfly. A mirror in the Servants Room could detect the colour of visitors' clothing and comment on it, e.g. "Red! I've seen a lot of red! It's a favourite colour of Kitty Bantock!"

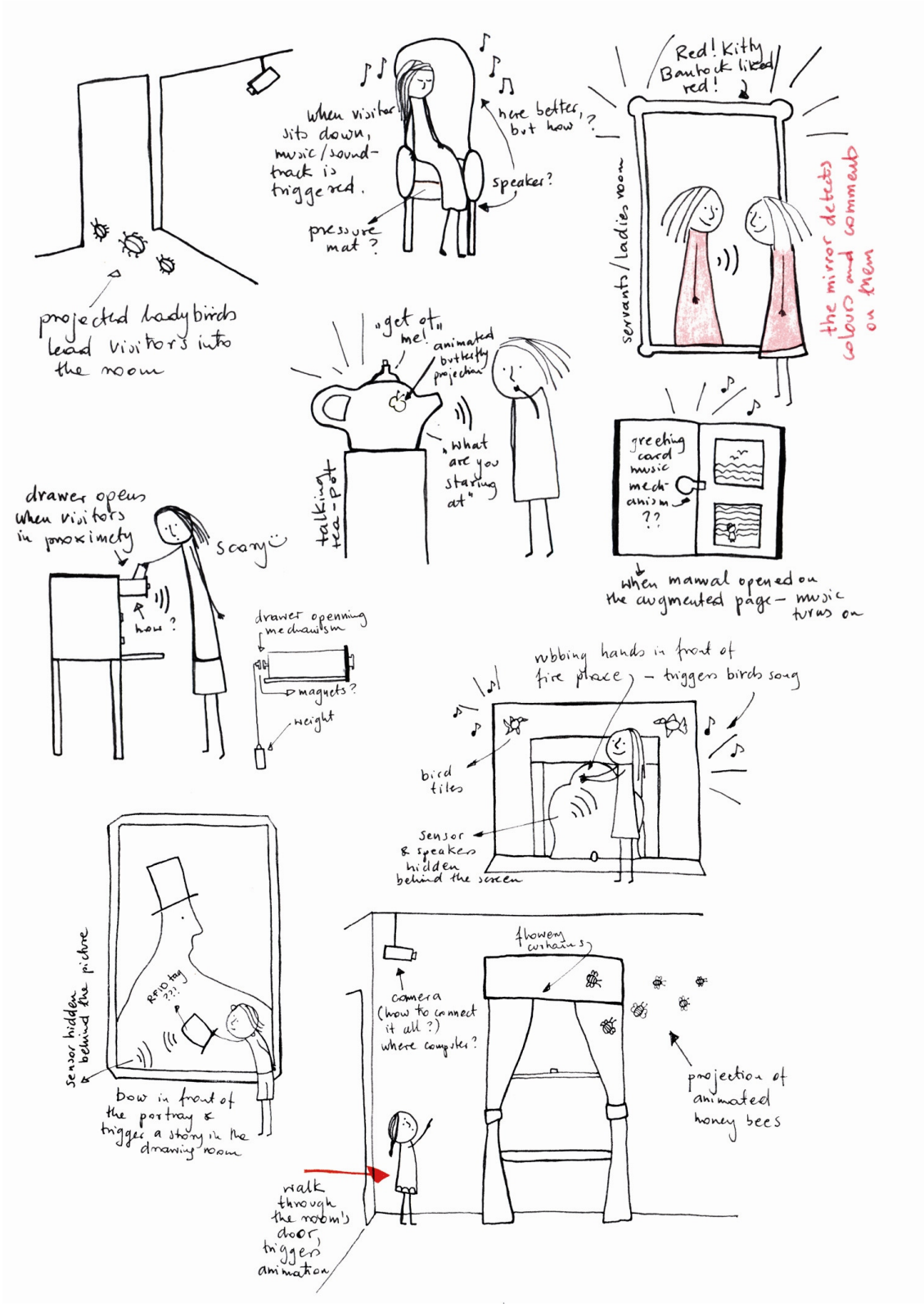

Figure 5.6 Sketches of different ideas for micro spaces

- There is a switch in the Dining Room that was used during meals to request the next course from the kitchen staff. It could be incorporated into an enhancement of the whole room, for example, if pressed it could trigger the soundtrack of people eating.
- There is a neglected statue of a dog on display in one of the vitrines in the Drawing Room. When visitors are in proximity of the dog, it could bark to draw their attention.
- There is "The Holiday Manual" in the Drawing Room featuring photographs of the Bantocks during their holidays at the seaside. If visitors would turn its pages, they could hear waves and children playing in on the beach.
- Drawers of the desk in the Drawing Room contain several documents and money notes from the Victorian period and are often neglected by visitors. In order to attract their attention, some of the drawers could automatically open when visitors are detected in their proximity.
- Visitors are invited to sit on pieces of furniture, such as the armchair in the Drawing Room. If a visitor would sit in the armchair they could hear a story about the room and its former users from the point of view of the chair.

Action-based micro spaces:

- In order to draw attention of visitors, projected honey bees (or other insects depicted on artefacts) could sit on the flowery curtains and fly away when visitors come into the room.
- The gesture of bowing in front of a large portrait of Mr Bantock in the Hall could be used as a key to unlock other installations in other rooms.
- If visitors rub their hands in front of the fireplace in the Drawing Room, as though they are cold, they could trigger the birds depicted on fireplace tiles to sing.
- In order to lead visitors into a particular room, projections of decorative elements could be used to mark the path. For example, when visitors enter the Hall, they could see a projection of a ladybird walking to into the Dining Room and leading them inside.

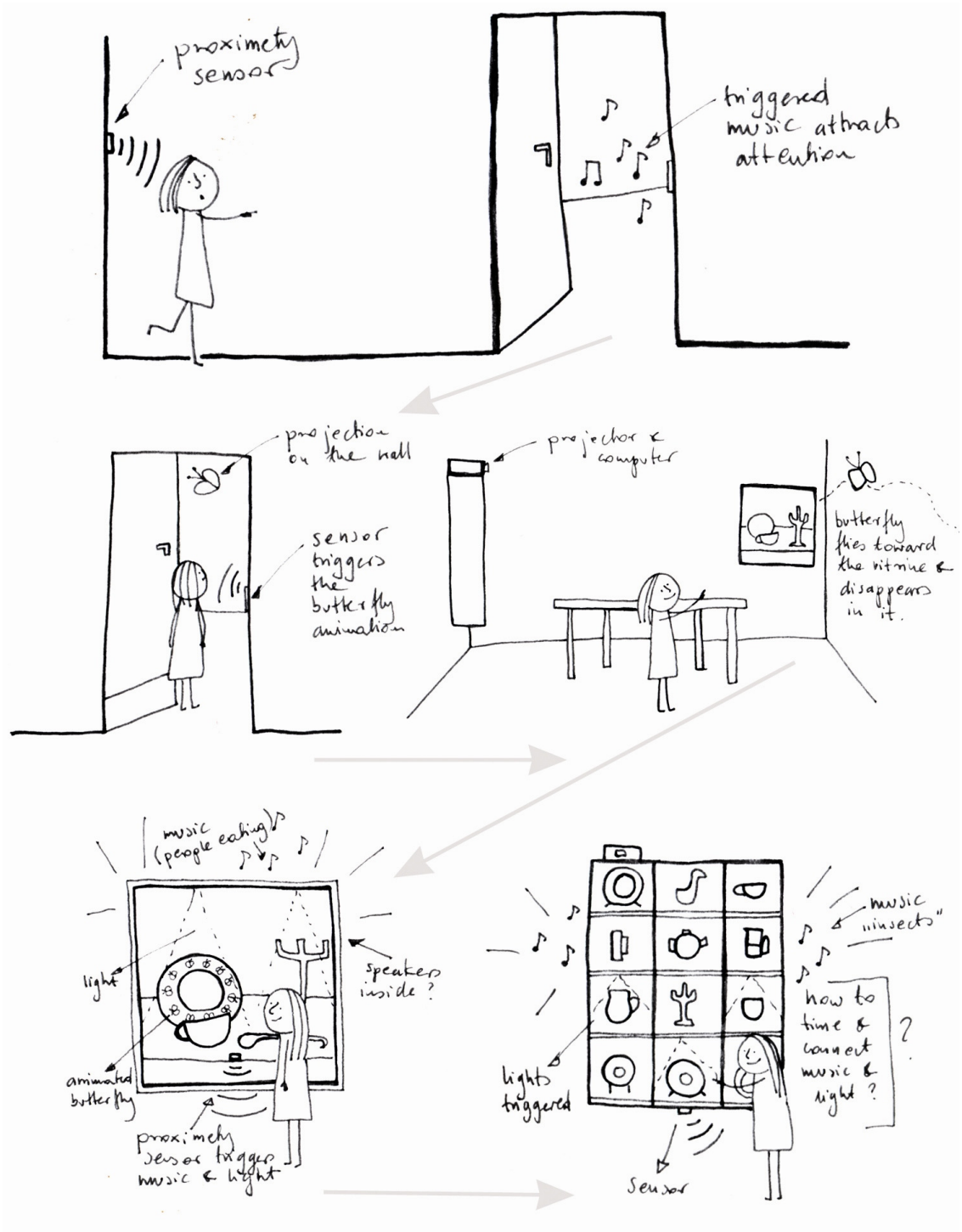

Figure 5.7 Further conceptual development of micro spaces chosen for the Dining Room

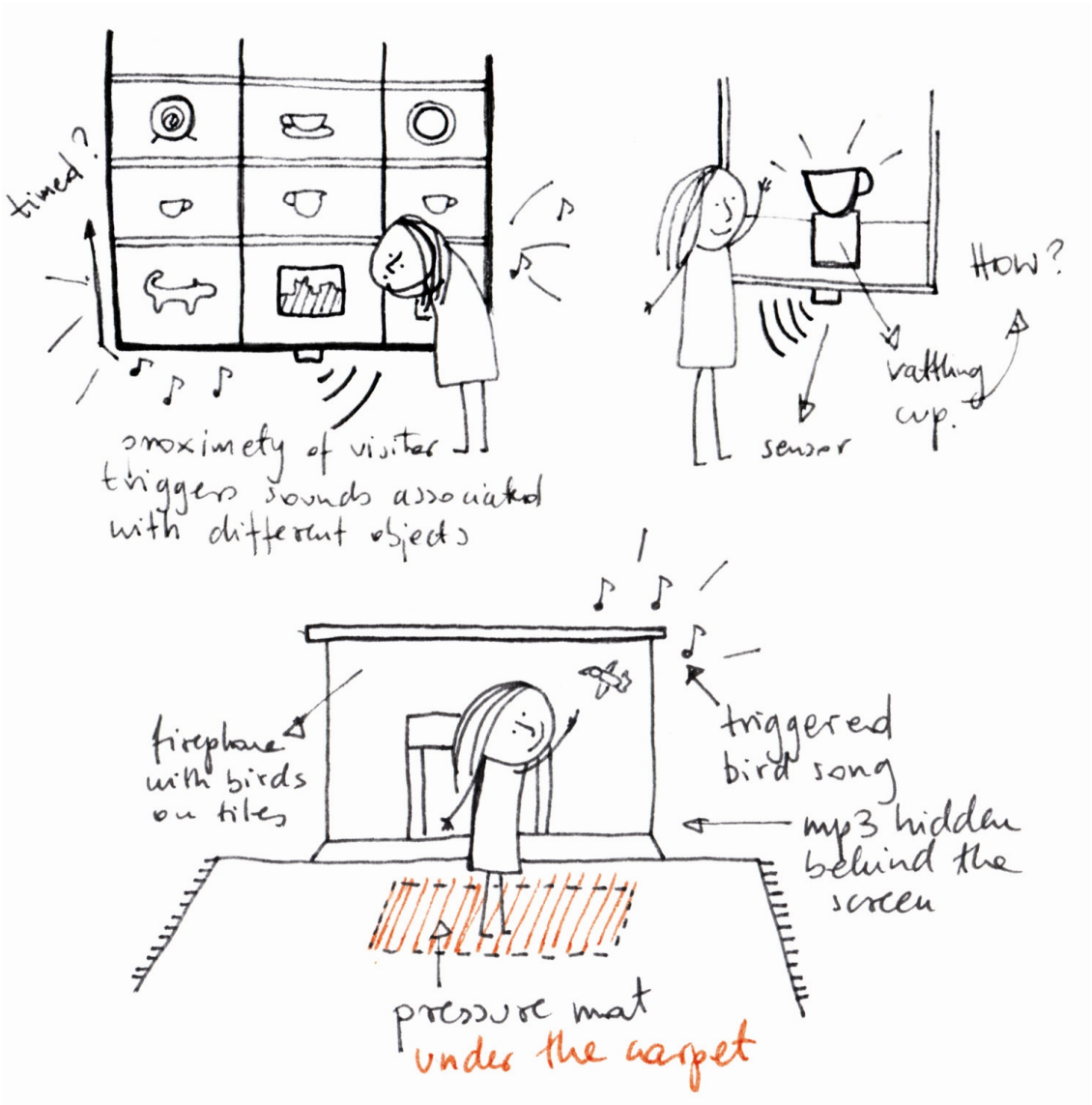

Figure 5.8 Further conceptual development of micro spaces chosen for the Drawing Room

5.1.3 STRUCTURE AND CONTENT OF THE INTERVENTION

The design concept is based on events triggered in the micro spaces. These happen as a response to the actions or presence of a visitor. There are two types of events: leading events and reward events. These events were scattered around exhibition space, concentrating on those objects that were observed to be neglected by visitors. If implemented over the whole museum, rooms that have been observed to already engage the audience would be presented with fewer micro spaces than those that were not as engaging.

Leading events were designed to guide a visitor in one particular direction or to a particular area. They can be general or specific. General leading events are visible over a distance and invite visitors to enter a room, e.g. when visitors enter the hallway, they see a ladybird running towards one of the rooms that contains a collection of plates upon which various insects are depicted. There can also be sounds which relate to the whole room or classes of objects, such as the sound of people eating while getting near to the Dining Room. Specific leading events lead to specific objects, for example when visitors enter a room, they see a butterfly flying across the wall and hiding behind a vitrine that contains a plate with the butterfly depicted on it.

Rewards are events that are triggered to reward visitors for finding specific objects. They only trigger when people are very close to them. They use elements from the objects (characters, animals, shapes, etc.) to create the enhancement. Rewards should be richer than leading events, i.e. consist of both sound and movement and animation (multiple elements), e.g. bird flies out of plate with a squeaky noise.

The analysis of observations suggested that the content of the micro spaces had to be based on and around non-evocative artefacts. Content based on historical facts was avoided. Catching the visitor's attention was the focal point and the content was, therefore, based on more emotive associations. This in turn created the possibility for artefacts themselves to become triggers of conversations and interactions (Simon 2010, § 4). Physical or imagined properties and elements of artefacts were used to create attractors, e.g. a butterfly from a plate in a vitrine was animated to fly on the wall (physical, visual element of the object) or a figure of a dog was made bark (imagined property of the object).

5.2 THE PROTOTYPE

In order to test the concept in real life, a prototype of the digitally enhanced space was developed and installed in the Drawing Room and Dining Room, as a demonstration of practice. The prototype was tested with users and evaluated.

5.2.1 CHOICE OF SPACE FOR INTERVENTION

While the design concept took the whole museum space into consideration, for the prototype only two rooms were chosen in order to make the intervention feasible. The Drawing Room and the Dining Room were selected based on the analysis of characteristics of the rooms and visitor behaviour.

Both the Drawing and Dining Rooms are situated on the ground floor of Bantock House Museum, at the end of the Downstairs hall corridor. The display in both rooms is based on static elements, such as a Victorian interior and objects in showcases. The remote location and lack of activities makes these rooms relatively unattractive to visitors in comparison with the rooms on the first floor, e.g. the Billiard Room. This was confirmed, in the Museum Detective Notebook, by answers given by children who wished these rooms to be redesigned. The observations revealed that visitors spend on average approximately 2.5 minutes in each of these rooms, of which around 12% was spent looking at objects in vitrines. This is less than a quarter of the average time spent in the Nursery Room, where visitors spent 11 minutes (cf. § 4.2.1, p.99). In both the Dining and the Drawing Room, the objects behind glass were observed to be not as attractive to visitors as other exhibition elements, such as pieces of interior in the Drawing Room and written examples of Victorian menus in the Dining Room. These features, which create potential for improvement, led to both these rooms being chosen for the design intervention.

5.2.2 PROTOTYPE STRUCTURE

The prototype consists of six micro spaces, three in each room (Figure 5.9). In order to investigate how the organisation of the digitally enhanced space influences the responses of visitors, the events were designed in two ways: path-based (the Dining Room) and chance-based (the Drawing Room). In the Dining Room, a sequence of general and specific events drew a path leading visitors through the display. In the Drawing Room, several events were placed in the exhibition space, building a non-chronological whole of connected elements. The prototype was realised in cooperation with Dr Christopher Dennett of the Computer Science Department of University of Wolverhampton, who assisted in programming and technical development. The technology used, therefore, is not regarded as a contribution of this study. Technical parameters of each micro space are included in the § 5.3, p.149. It is advisable for the reader to watch the documentation film before proceeding (see DVD § 8.4.4).

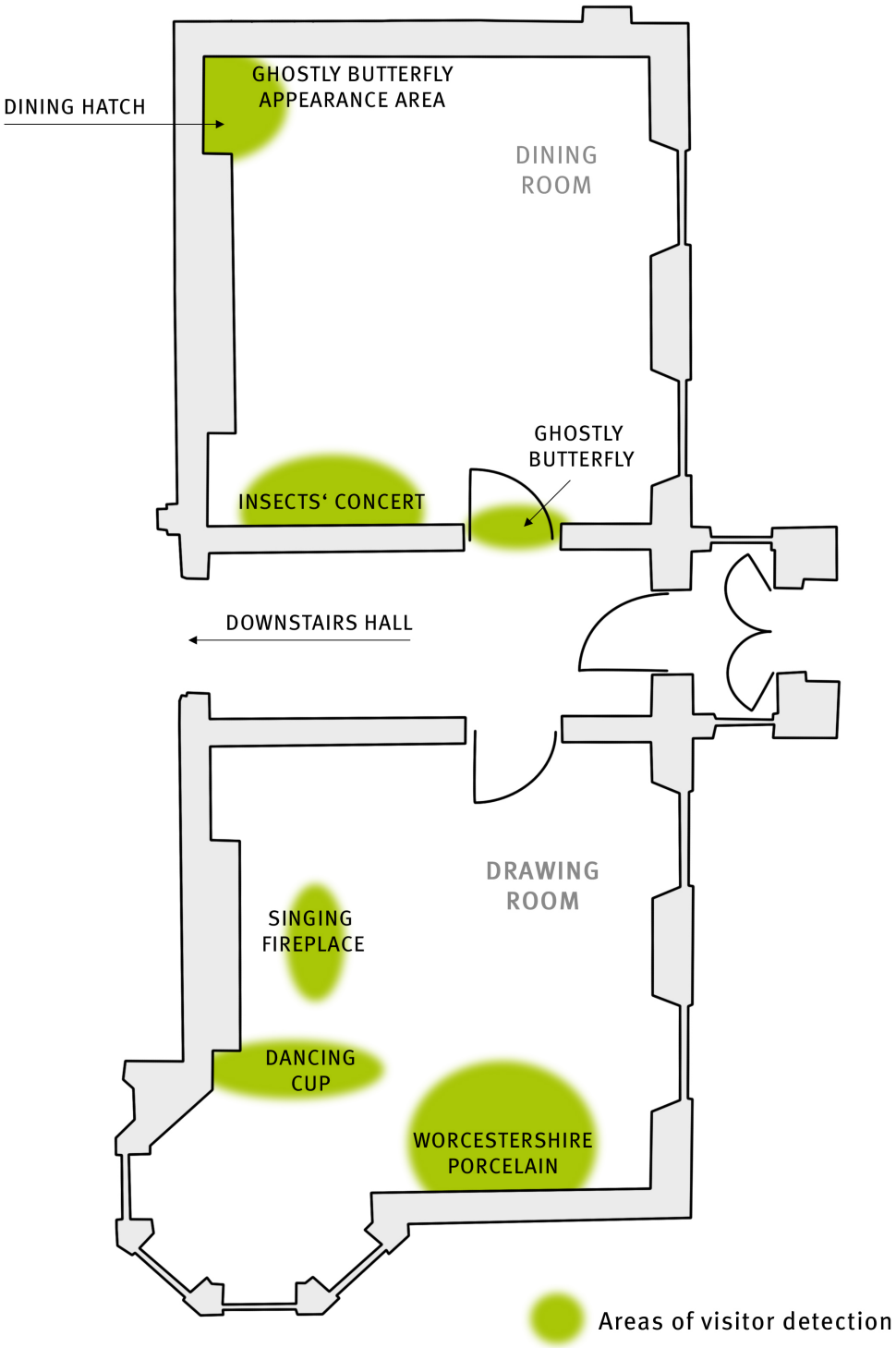

Figure 5.9 The placement of micro spaces with the ranges of visitor detection

The Dining Room system consisted of three interconnected micro spaces:

1. Ghostly Butterfly

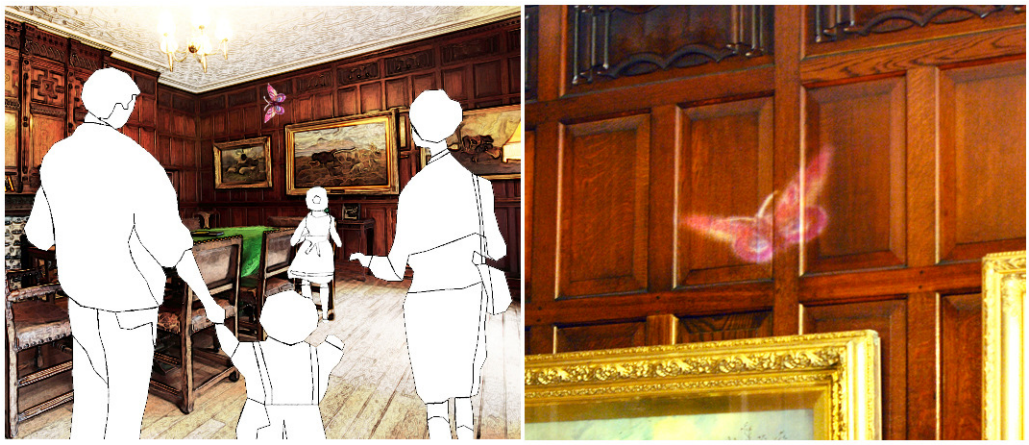

Figure 5.10 The Ghostly Butterfly animation

Most of the porcelain displayed in the Dining Room is decorated with depictions of insects. In order to turn the attention of visitors to those details, one of the depicted butterflies was photographed and animated (Figure 5.11). The film was projected onto the wall in the Dining Room, opposite the door. When visitors came into the room, it looked as if a butterfly fluttered across the wall and disappeared just above a vitrine which contained the object from which this butterfly was taken (Figure 5.10).

2. Dining Hatch

Figure 5.11 The Dining Hatch (left) and the butterfly decoration detail (right)

The Dining Hatch was a micro space built around a vitrine situated on the left hand side in the corner of the room. This showcase presents elements of Victorian dining culture, i.e. cutlery, a typical soup bowl and a plate decorated with butterflies (Figure 5.11). Two seconds before the butterfly animation finished, lights in this vitrine flashed three times and stayed turned on. If the visitors came up to the Dining Hatch, they would hear the sound of people eating mixed with music from the period. The music lasted as long as visitors stood in front of the vitrine.

3. Insects' Concert

The large vitrine next to the door contains a collection of plates from the period decorated with pictures of different insects, such as grass hoppers, butterflies and beetles (Figure 5.12). In order to attract the attention of visitors, after receiving a message from the previous micro space, a soundscape of an evening meadow would be played. The presence of visitors in proximity of the showcase triggered lights inside of the vitrine. The lights illuminated each artefact for a short amount of time (around 5 seconds). After 20 seconds of lights on over all plates, the music stopped and the lights were turned off. The loop could be triggered again.

Figure 5.12 The Insects' Concert micro space

If visitors didn't come up to the corner vitrine (Dining Hatch) the lights flashed and stayed on for 20 seconds. Then they turned off and sent a signal to the large vitrine to play the evening meadow mp3, which, if the sensor was not triggered, stopped after 16 seconds. The loop was ready to be triggered again.

The Drawing Room system contained three independent micro spaces:

4. Worcester Porcelain

Figure 5.13 The Worcester Porcelain micro space. From the left: the barking dog, the Victorian town and the musicians

The vitrine opposite the door contains Worcester Porcelain. On the, most neglected, bottom shelf, there are a figure of a dog, a depiction of a Victorian town painted on a porcelain plate and two figures of a couple playing musical instruments (hammered dulcimer and drum) (Figure 5.13). Accordingly three different soundscapes were created to enhance the figures: the barking of a dog, a cityscape of an old town and Victorian music with an example of hammered dulcimer play. By coming up to the vitrine, visitors triggered the lights in the vitrine over one of the figures and set off the appropriate soundscape (Figure 5.14). As long as visitors were detected in front of the cabinet, the soundtrack and lights changed every seven seconds.

Figure 5.14 The Worcester Porcelain micro space in use

5. Dancing Cup

Figure 5.15 The Dancing Cup micro space

The Drawing Room has a collection of tea sets, displayed in a glass cabinet near the window. During initial observations these were neglected by most visitors. In order to enhance their evocative features, when approached by visitors, one of the cups rattled on its saucer (Figure 5.15).

6. Singing Fireplace

Figure 5.16 The Singing Fireplace micro space. The pressure mat was hidden under the carpet in front of the fireplace

The Bantock daughters collected Dutch porcelain tiles that decorated the fireplace in the Drawing Room (Figure 5.16), on the left hand side from the Dancing Cup. The tiles are

hand painted with different types of birds. The micro space would play birdsong when visitors stood in front of the fireplace.

The actual implementation of the prototype took place over February and March 2012. This involved: the creation and testing of the micro space components in the lab, sourcing equipment and props, setting up in the exhibition space, testing and technical refinement of digitally enhanced spaces. The prototype was available to the public from the end of March until September 2012.

5.3 TECHNICAL PARAMETERS OF MICRO SPACES

In this section the technical specifications of the micro spaces designed for the prototype exhibition space are discussed in detail.

In order to create an immersive multisensory experience, the digital enhancement was based on a combination of various media that included animation, sound, light and movement. RFID tags, a wireless non-contact system that uses a radio frequency to transfer data, were tested as a triggering device in the early design stage. The detection range of the RFID sensors available was not, however, sufficient. For that reason, infrared proximity sensors replaced RFID tags as triggering devices. A minor drawback of this solution was that reward events (e.g. Dining Hatch lights) were triggered by all visitors, not only by children. This was not regarded as a serious limitation as children responded in any case more often to the micro spaces than adults. Additionally, the triggering of rewards by proximity only put limitations on the kinds of effects that could be used. More complex ideas where micro spaces which had previously been encountered affected other micro spaces triggered later (e.g. bowing before Mr Bantock's portrait to unlock other micro spaces) had to be discarded. Each micro space was controlled by an Arduino, an open-source single-board microcontroller. All events were timed. Once triggered, those events did not play again for a set time period. This was done so as not to hinder normal

museum activity. All digital prototype components, including Arduino programmes used, are available in the Appendix, DVD § 8.4.5.

In the Dining Room, Arduino boards were interconnected, so that the action of each Arduino depended on actions of a previous board. ZigBee, a small low-power digital radio standard, was used to allow the communication between boards.

1. Ghostly Butterfly

A proximity sensor was placed on the door frame of the Dining Room and controlled by an Arduino board. A pico-ITX computer (running Windows XP) and a projector were placed on top of a large vitrine next to the door and controlled by a second Arduino. By entering the Dining Room visitors triggered the proximity sensor. The connected Arduino sent a message via ZigBee to the Arduino that controlled the computer, to play the butterfly animation (see DVD § 8.4.5), which was projected onto the wall opposite. When triggered, the second Arduino sent an ASCII character that was interpreted by the computer as a keyboard shortcut. This shortcut activated VLC player, starting the animation. Towards the end of the animation, when the butterfly is heading towards a corner vitrine (Dining Hatch micro space), a message was sent to the Arduino controlling the next micro space to turn the lights on.

2. Dining Hatch

When the animation of the Ghostly Butterfly finishes, the Arduino board controlling Dining Hatch receives a message via ZigBee to flash the lights in the vitrines three times and leave them on. There were two scenarios that could follow. In the first scenario, if visitors were detected by a proximity sensor in the vitrine, an mp3 player with connected speaker was turned on and music was played (see DVD § 8.4.5). When visitors were no longer detected, the music was tuned off and a message was sent via ZigBee to the large vitrine next to the door to start the next micro space. In the second scenario, if visitors

were not detected in the proximity of the vitrines, the lights and music would stay on for 16 seconds, then turn off automatically and send a message to the next connected Arduino.

3. Insects' Concert

When the Arduino board, controlling this vitrine, receives the message from Dining Hatch, an mp3 player with connected speakers was activated and a soundscape of an evening meadow was played (see DVD § 8.4.5). If visitors were detected by a proximity sensor, lights above three chosen objects were illuminated in an ordered sequence. They stayed on for 20 seconds. When the music stopped, the lights were turned off as well. The loop was reset and could be triggered again.

In the Drawing Room, the micro spaces were not interconnected with one another.

4. Worcester Porcelain

A proximity sensor, connected to the Arduino board, was used to detect the presence of visitors. Additionally, there was an mp3 player with connected speaker connected to the board. When visitors triggered the sensor, lights over one of three enhanced figures were turned on and an appropriate soundscape triggered (see DVD § 8.4.5). As long as visitors were detected in front of the cabinet, the soundtrack and lights changed every seven seconds.

5. Dancing Cup

This installation was triggered by a proximity sensor hidden under the vitrine. The cup and saucer were placed on a Plexiglas box, inside of which a servo was attached. When triggered, the sensor sent a message to the controlling Arduino board and the servo turned its cam back and forth hitting the bottom of the box and making the cup move.

6. Singing Fireplace

There was an mp3 player, a speaker and an Arduino board installed under a cupboard near the fireplace. When visitors stood on the pressure mat hidden under the carpet in front of the fireplace, the mp3 player was triggered to play birdsong (see DVD § 8.4.5).

Changes in the design

Before conducting the main final observations, the prototype was tested and redesigned. Participant observation was found to be an effective tool to reveal possibilities for prototype development. The micro spaces in the Drawing Room worked independently from one another. They were observed to be a reliable and stable system, whereas the interconnecting message system used in the Dining Room brought several technical challenges for design. The prototype was installed in the mornings, when the museum is not available to visitors. This meant that the exhibition space was relatively silent. During the first day of testing, it was noted that the micro space which was meant to lead visitors to the Dining Room with a soundscape did not work exactly as planned; the museum was sometimes too loud and visitors could not hear the music. In the quieter times, however, they were also observed to ignore or avoid the sounds and choose a different path. Issues with sound and the path choice led to a redesign decision in which the sensor in the corridor and the remote were disconnected from the system. The Dining Room path started then with a triggered sensor placed at the door. This meant that the door sensor was also triggered when visitors were leaving the room. This was, however, observed not to hinder visitors' interaction with the space and even made some of them, especially younger ones, come back to the room and engage with the interactions a little longer.

The Drawing Room worked well without any changes, although the Singing Fireplace micro space was often ignored, possibly mistaken for sounds from Bantock Park. It is possible that more characteristic sounds (the dog barking) or only those that appear in conjunction with other prompts, e.g. visual (light), are needed to draw the attention of

people. In the future, different kinds of sounds as well as mixed media installations based on sound could be tested.

5.3.1 PROTOTYPE TESTING

The prototype testing with users was conducted in April 2012 and lasted three weeks, including one week for redesigns and adjustments. First, a random sample of new and returning child and adult visitors in groups and as individuals was observed while using the digitally enhanced space. This was done to allow any initial difficulties to be overcome, making necessary redesigns and adjustments. During the following two weeks, testing was carried out in conjunction with data collection mainly through participant observations (cf. § 3.4.1, p.77). Here the focus lay on family groups selected according to the same criteria used during initial observations (cf. § 3.4.6, p.82).

Based on overheard in-gallery conversations and face-to-face interactions between visitors, museum workers and the researcher, the general reaction to the prototype by visitors was very positive. In the Dining Room, visitors tended not to follow the path intended, but discovered triggers randomly. In the Drawing Room, the open character of the digital enhancement fitted well the meandering of the visitors. Visitors most often reacted with excitement or surprise to the following micro spaces: Ghostly Butterfly in the Dining Room, Worcester Porcelain and Dancing Cup in the Drawing Room. It was also observed that adult visitors tended to be more surprised or even startled by the unexpected actions. Groups of only adults sometimes ignored the micro spaces or reacted only with a short comment, for example: 'That's for kids.' Family groups observed tended to stop in front of the micro spaces more often, reacting non-verbally (smiling, pointing out to others) or verbally (laughing, commenting). Some micro spaces were observed to prompt conversations about the digital technology.

Results of the analysis of data gathered in the digitally enhanced exhibition space are presented in the following chapter.

6 STAGE 3: FINAL OBSERVATIONS

Following the same methodological model as during the initial stage (cf. § 4, p.89), participant observations constituted the main qualitative and quantitative data source in the final observations. To gather supplementary data, 20 family groups were interviewed and additional field notes completed. In this chapter, the analysis of the data gathered is presented and discussed.

A total of 79 family groups were observed while interacting with the exhibition space. As in the initial observations, each group comprised at least one adult and one child. The observations were carried out in two rooms containing micro spaces: the Dining and the Drawing Room. 48% of observed participants were children (age: 0-17, 103 male and 141 female) and 52% adults (90 male and 164 female), of which two thirds were parents (Figure 6.1). These numbers are comparable with the initial observations, where the percentage of child participants observed was only slightly higher (51%).

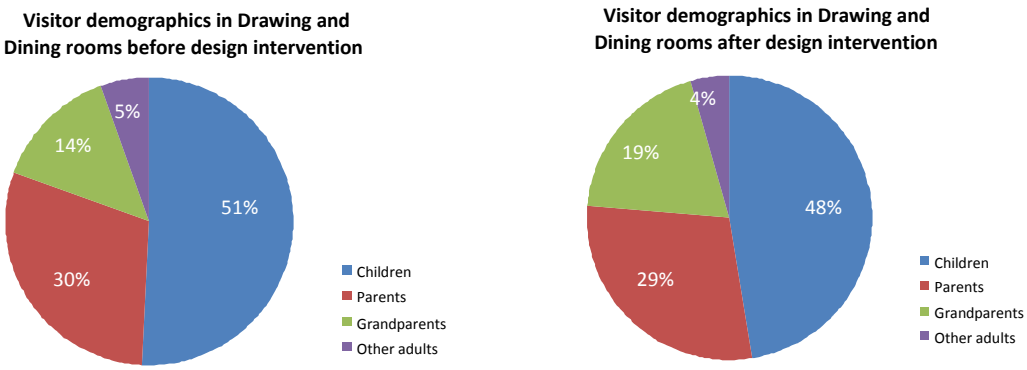

Figure 6.1 Visitor demographics in Drawing and Dining Rooms before and after design intervention

The observations were carried out by the researcher, equipped with a stopwatch and recording sheets to enable structured and systematic data collection (cf. Appendix § 8.1, p.199).

Changes to the interior

There was a gap of one year between initial and final observations and some changes to the interior design of the museum had been made during this time. During the observations made before design intervention there had been a desk standing opposite the entrance area of the Dining Room and a side table standing between the windows. A year later, the desk had been removed and a bottle quiz from the Billiard Room had been placed on the table. Additionally, a working grandfather clock was placed between the windows. These minor changes to the contents of the room had no significant impact on the observations. There were no changes made to the interior design of the Drawing Room within the year.

6.1 THE ANALYSIS OF THE FINAL OBSERVATIONS

The results of the final observations are presented in a comparative analysis with the outcomes from the initial observations (cf. analysis spreadsheets, DVD § 8.4.6 and comparative tables with values, Appendix § 8.5, p.223). They are discussed according to categories used in the initial observations, i.e. average time spent in the room and time spent on communication around exhibition elements, evocative objects, verbal and non-verbal interaction between visitors.

6.1.1 TIME EQUALS ENGAGEMENT

The first task for the analysis of the observations was to confirm that the basic requirements for the occurrence of social dream spaces were present, i.e. visitors made contact and engaged with objects on display, as well as contact and communication with other visitors. Time spent in the digitally enhanced rooms and how this time was spent was, therefore, a major concern.

Table 6.1 The average time spent in the Dining Room, on communicating around exhibition elements and on looking at objects in vitrines (absolute values in minutes and seconds; change in percentage of before value)

Dining room: Average time spent	Absolute values in minutes		
	Before	After	Change
in the room	02:41	03:22	25.8%
communicating around exhibition elements	01:27	02:06	45.1%
looking at objects in vitrines	00:18.4	00:16.6	-10.1%

Table 6.2 The average time spent in the Drawing Room, on communicating around exhibition elements and on looking at objects in vitrines (absolute values in minutes and seconds; change in percentage of before value)

Drawing room: Average time spent	Absolute values in minutes		
	Before	After	Change
in the room	02:24	03:23	40,6%
on communicating around exhibition elements	01:27	02:02	39,5%
on looking at objects in vitrines	00:20	00:47	136,1%

On average, families tended to spend more time in both digitally enhanced rooms, than they had before the design intervention (Table 6.1 & Table 6.2). The average time spent per group in each room showed a large increase: an increase of more than 40% in the Drawing Room (59 seconds longer) and more than 25% in the Dining Room (42 seconds longer). In both rooms this was mirrored by a corresponding increase in the time that families spent on communication around exhibition elements, including objects in showcases. In the Drawing room this constitutes an increase of 35 seconds per group (39,5% increase). In the Dining Room, the time spent on communication around exhibition elements showed an increase per group of about 39 seconds (45% increase).

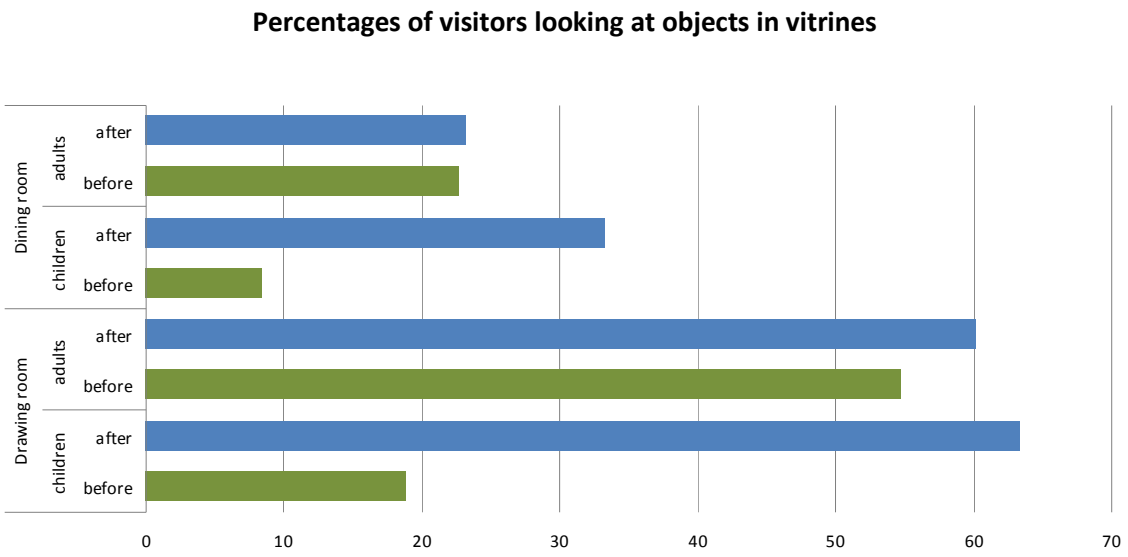

Figure 6.2 Comparison between child and adult visitors who were looking at objects in vitrines before and after the design intervention (in % of visitors to the room)

Changes were also observed with regard to the time that families spent on looking at objects in showcases (Table 6.1, Table 6.2 & DVD § 8.4.6). Before the design intervention, families spent on average 20 seconds (14% of time spent in the room) on this activity in the Drawing Room and 18 seconds (11% of time) in the Dining Room. After the digital enhancement, average time spent on looking at objects in the Drawing Room was more than doubled (change of 136%), which constitutes 32 seconds of average increase. In the Dining Room, after the digital enhancement, average time spent on this activity stayed almost unchanged (average 1.8 second decrease). It is interesting to compare this information with the numbers of visitors who engaged with objects behind glass (Figure 6.2). After the design intervention, a large increase of the percentage of child visitors who were observed looking at objects in vitrines was noted in both rooms: from 18.9% to 63.5% in the Drawing Room and from 8.5% to 33.3% in the Dining Room. The percentage of adult visitors looking at those objects changed only in the Drawing Room (an increase of only 5.4%). In the Dining Room, these numbers remained unchanged (23% of all adults).

Thus, it can be concluded that in both rooms more visitors (especially children) engaged with artefacts in showcases and families spent more time communicating around exhibition elements.

6.1.2 *TOWARD SHARED ENGAGEMENTS*

It is clear from data gathered (Figure 6.3) that more verbal indicators of engagement were noted in the responses of both adults and children after the design intervention.

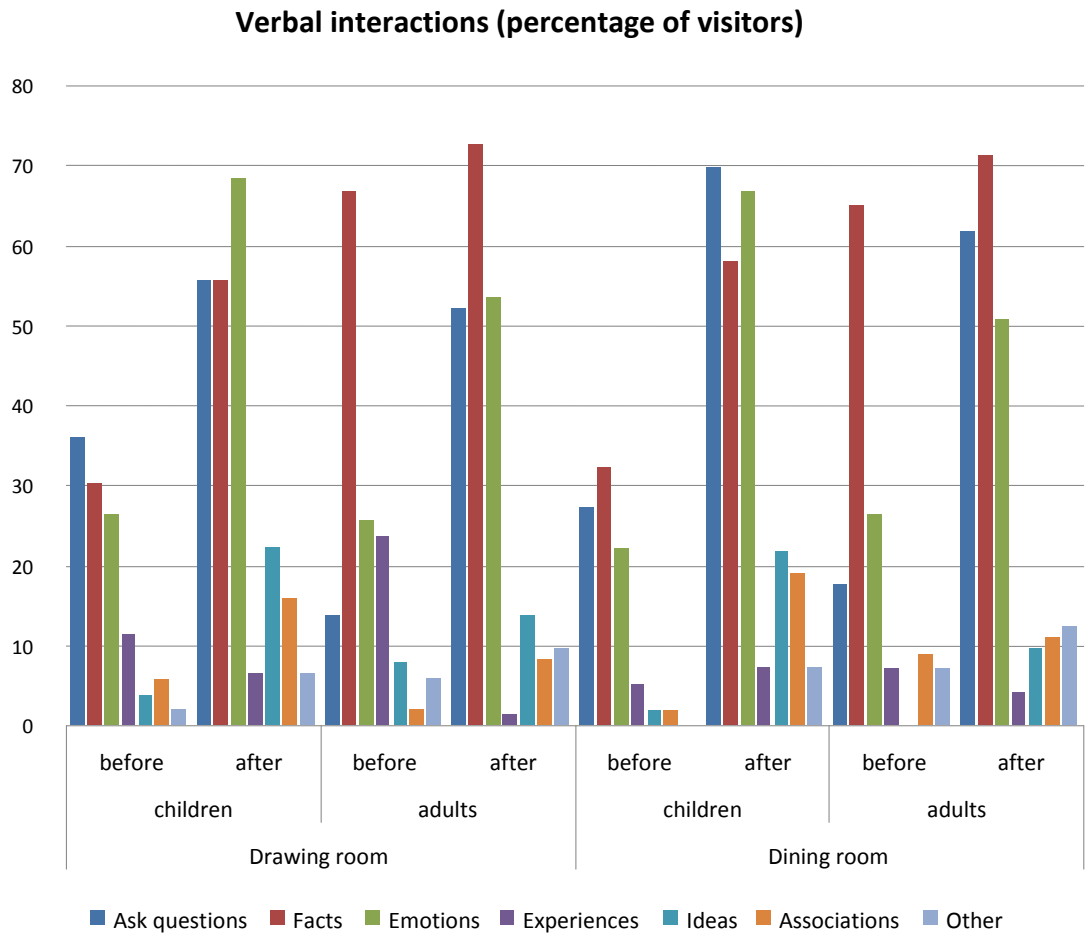

Figure 6.3 Comparison of verbal interactions between child and adult visitors before and after the design intervention (in % of visitors to the room)

Before the Dining Room was digitally enhanced, verbal communication of adults in that room was based mainly on sharing historical facts (65% of all adult visitors were observed sharing historical facts) and emotions (26% of adult visitors). They also often asked leading questions (17%), mostly to test children's knowledge, e.g. "Do you know

what it is?" Verbal communication of child visitors was based on the three categories: sharing facts (32% of all children observed), asking questions (27%) and expressing emotions (22%). Children's questions, however, dealt with facts and immediate impressions, e.g. "Is that Mr Bantock?", "Do you see it?"

The analysis of data gathered shows considerable changes in verbal communication of adults and children in the Dining Room after implementation of digital enhancement. Adult visitors were still observed sharing mostly knowledge based facts, but their activity in other areas increased radically. The percentage of adult visitors recorded expressing emotions increased from 26.3% to 50.7%. They also were observed sharing ideas with their children, which had not been noted before the design intervention. Significantly more children were noted asking questions, sharing emotions, generating ideas and making associations than during initial observations. Most of this communication happened around the digitally enhanced space of the animated butterfly and connected objects. The following conversation between mother, father and their daughter is a typical example of a reaction to the space (cf. Observation Sheet (OS) A9, DVD § 8.4.6):

> Girl follows the butterfly animation to the corner vitrine and then follows the sound to the large vitrine next to the door. When the butterfly animation is triggered again, the father notices it.
>
> Father (pointing): Butterfly.
>
> Girl: Here it is again! Mum look!
>
> Mother (with delight, observing the animation): Oh, yes!
>
> Girl comes up to the corner vitrine and asks her father: Can you hear it?
>
> Father comes up to her. They look at objects in the vitrine, smile to one another and listen to the triggered sounds. Girl gets excited every time the butterfly appears. She jumps up and down and laughs. Her parents respond with smiles.

Similarly, in the Drawing Room before the design intervention, the adult verbal communication was mainly focused on passing on historical facts (66% of all adults observed) and expressing emotions (25%). They also were observed sharing experiences (23%), mostly about daily life in the past. Children, on the other hand, were mostly observed asking questions (36% of all children observed), talking about facts (30%) and expressing emotions (26%).

After the design intervention, a striking decrease, from 23.5% to 1.4% of adult visitors, was observed in the category of verbal communication of memories and experiences. Conversely, both child and adult visitors tended to share more immediate reactions to the exhibitions space, which included emotions, ideas and associations. Conversations and comments overheard during in-gallery observations illustrate typical reactions:

(cf. OS A2, DVD § 8.4.6)

Boy: That's awesome mum! [He dances around and comes back to the vitrine and looks closely at the objects.] It's so cool, this music everywhere!

(cf. OS A76, DVD § 8.4.6)

Girl A: Look at that!

Girl B: That's scary!

(cf. OS A72, DVD § 8.4.6)

Boy: Oh that's cool!

Grandmother: That's magic.

The data gathered indicate a shift from a factual to an imaginative type of communication between child and adult visitors. After the design intervention participants were more verbally active. Sharing of historical facts was observed less often, and then was mostly based either on own experiences or the knowledge retrieved from manuals and books

available in the rooms. In digitally enhanced spaces, visitors tended to share more ideas, emotions and associations.

6.1.3 *EMPOWERMENT OF CHILD WITHIN FAMILY GROUP*

It is apparent from Figure 6.4 that child visitors in particular were significantly more non-verbally active after the design intervention.

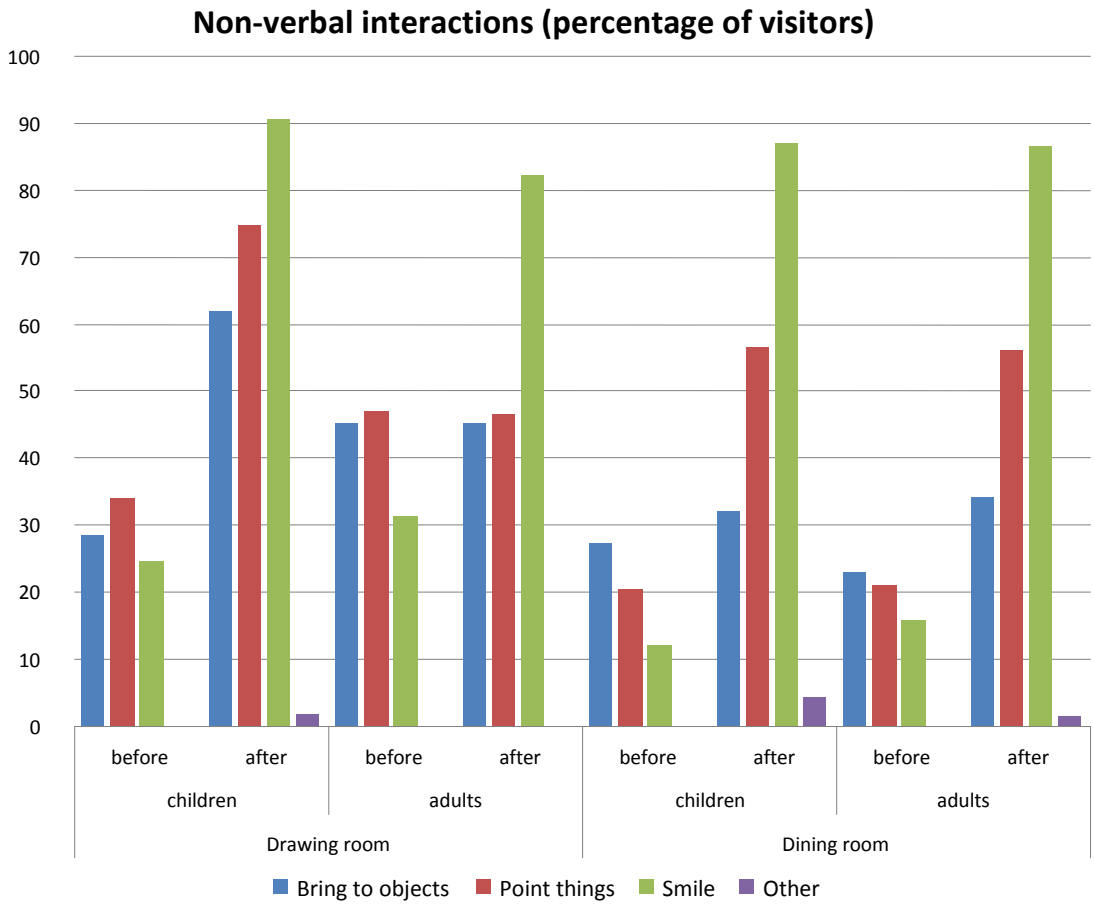

Figure 6.4 Comparison of non-verbal interactions between child and adult visitors before and after design intervention(in % of visitors to the room)

In the Dining Room, large increases were noted in the categories of pointing things out to other members of the group and smiling. The percentage of child and adult visitors observed pointing elements of the exhibition out to one another both increased from about 20% to over 55%. The elements pointed out were mostly non-tactile and included: the butterfly animation, the grandfather clock and paintings. Both child (87% of all

children observed) and adult visitors (86.3% of all adults observed) communicated by smiling considerably more than before the design intervention. Additionally, children in the digitally enhanced Dining Room were observed communicating in ways not previously observed, including jumping up and down or clapping their hands, as for example in the following scene observed (cf. OS A24, DVD § 8.4.6):

> A boy jumps up and down, trying to reach up and touch the butterfly animation. When animation finishes, the boy says: "Where's the butterfly gone? Butterfly? Where are you?" When music in Dining Hatch turns on, the boy and his family (father and older sister) come up, lean towards the hatch and listen to the music. They look at the objects on display. The boy says, pointing the butterfly depicted on the plate: "That's the same butterfly!"

Regarding child visitors, similar correlations were noticed while analysing non-verbal interaction in the Drawing Room. After the design intervention, the percentage of child participants observed pointing out elements of the exhibition to other family members increased from 34% to 75% and the percentage of children bringing others to objects on display increased from 28% to 62%. Most non-verbal communication was centred on digitally enhanced elements (the barking dog and the dancing cup), as well as elements mentioned in the 'Museum Detectives' quiz, i.e. paintings, elements of interior. As in the Dining Room, some children communicated in more expressive ways, as shown by the following examples (cf. OS A53, DVD § 8.4.6):

> A girl triggers the barking dog. She runs up close to the vitrine and tries to find the source of the sound. She looks at the barking dog for a while. When the soundtrack changes to the example of Victorian music, the girl starts to dance.

Family group in the Drawing Room (mother and three sons) (cf. Field Note 1, DVD § 8.4.6):

> The group triggers the barking dog while passing. They stop in front of the cabinet and observe objects on display. Boys get excited each time when new music is activated. They smile, point the figures out to one another and clap their hands. The dancing cup startles them. They stop only for a while and when it does not move again, they continue on to another cabinet. The older boy comes back to the dancing cup; he stands in front of it and jumps up and down whenever it moves.

Apart from a huge increase in the amount of smiling observed, almost no changes were noted in the non-verbal responses of adult visitors in the Drawing Room. In the analysis of initial observations, the Drawing Room was already one of three museum rooms where adult visitors were more non-verbally active than children (cf. § 4.2.3). This room is often the first that families visit and children had here been observed to be rather reserved and shy. After the design intervention, adults were as active as they had previously been, but children were observed taking over the leading role. The manner of the non-verbal interaction of adult visitors was observed to have changed slightly. Before the design intervention, adults had tended to concentrate on objects that represented some kind of knowledge value to them. In the changed space, adult visitors were observed not only pointing out elements related to knowledge gain or everyday life, but also those considered fun or prepared for children (e.g. micro spaces). These non-verbal queues were often supported by verbal comments, such as: “This is great for children!” or “It’s to draw children’s attention.” Non-verbal responses of some adults to the exhibition space resembled those of children. They communicated their own excitement or wonder by pointing to objects of interest, which was often accompanied by verbal messages, e.g. “It’s beautiful, isn’t it?”

The above results show that in the digitally enhanced space, especially the Dining Room, more non-verbal indicators of engagement were observed in the interaction of child and adult visitors with the exhibition space. The significant positive change in communicating their responses to others, indicates children's empowerment within the family group, which was one of the goals of the design brief (cf. § 4.5.1, p.123).

6.1.4 *ENHANCING NEGLECTED OBJECTS*

The core aim of this research was to create a space that encourages non-physical contact with museum objects displayed behind glass. The analysis of data gathered revealed positive changes in visitors' responses after supplementing the exhibition space with micro spaces. Before the design intervention, visitors to the Dining and Drawing Rooms tended to communicate mostly around tactile elements of the exhibition (interior, manuals and props). In the digitally enhanced space, however, most communication between visitors centred on non-tactile elements, such as paintings, photographs and objects in showcases.

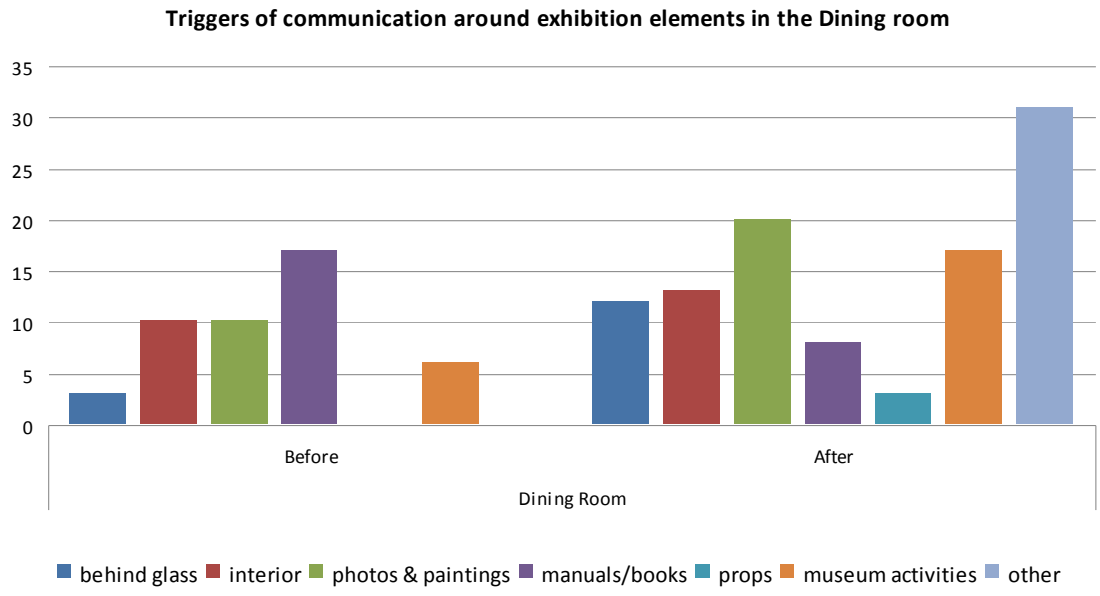

Figure 6.5 Communication around exhibition elements in the Dining Room before and after the design intervention (in absolute values)

In the Dining Room before the design intervention, most evocations had been triggered by manuals presented at the table in the middle of the room (17 out of 46 (37%) visitor object-centred interactions) (Figure 6.5, p.165). The groups had been observed gathering around the table, with one member turning over the pages and others commenting on the content. Most interactions had been triggered by examples of dinner menus from the Victorian era and the Bantock family album with photographs of residents of the house. 10 out of 46 (22%) visitors' interactions had been triggered by the interior of the Dining Room, including the decorative fireplace, a desk and a large dining table. 6 out of 46 (13%) interactions occurred while visitors were engaging with the 'Museum Detectives' quiz. The tasks of the quiz were focused on paintings and 10 out of 46 (22%) visitor communication had been triggered by this category of objects. Only 3 out of 46 (7%) object-centred interactions observed had been created around artefacts displayed behind glass.

After the design intervention (Figure 6.5, p.165), most evocative elements of the Dining Room were non-tactile, including the butterfly animation (31 out of 104 (30%) visitor object-centred interactions, category 'other') and photographs and paintings (20 out of 104 (19%)). The most dramatic drop observed was in the text based elements, such as manuals and menus, which constitute only 8% (8 out of 104) of all evocations (reduced from a starting point of 37% of evocations during the initial observations). The objects behind glass triggered 12% (12 out of 104) of interactions after design intervention, a marked increase on the 7% (3 out of 46) recorded before enhancement.

During the initial observations, visitors in the Drawing Room had tended to communicate mostly around the tactile elements of display, i.e. the interior (20 out of 49 (41%) visitor object-centred interactions) and the manuals and books (8 out of 49 (16%) visitor object-centred interactions). Objects displayed in vitrines triggered 12% of all visitor communications (6 out of 49).

After the design intervention (Figure 6.6), visitors communicated mostly around groups of objects displayed in showcases (23 out of 75 (31%) visitor interactions), especially those which had been digitally enhanced: the dancing cup and the barking dog. It was observed that visitors whose attention was drawn to the vitrines by micro spaces, often stayed longer to look at other objects on display. The second most evocative group of objects (14 out of 75 (19%) interactions each) constituted: interior and photographs & paintings. This reflects the 11% increase in the percentage of visitors who were doing the 'Museum Detectives' quiz, which is based only on these exhibition elements. Manuals and books triggered only 4% (3 out of 75) of all interactions, which is a considerable drop in comparison to the initial observations where they triggered 16% (8 out of 49) of interactions.

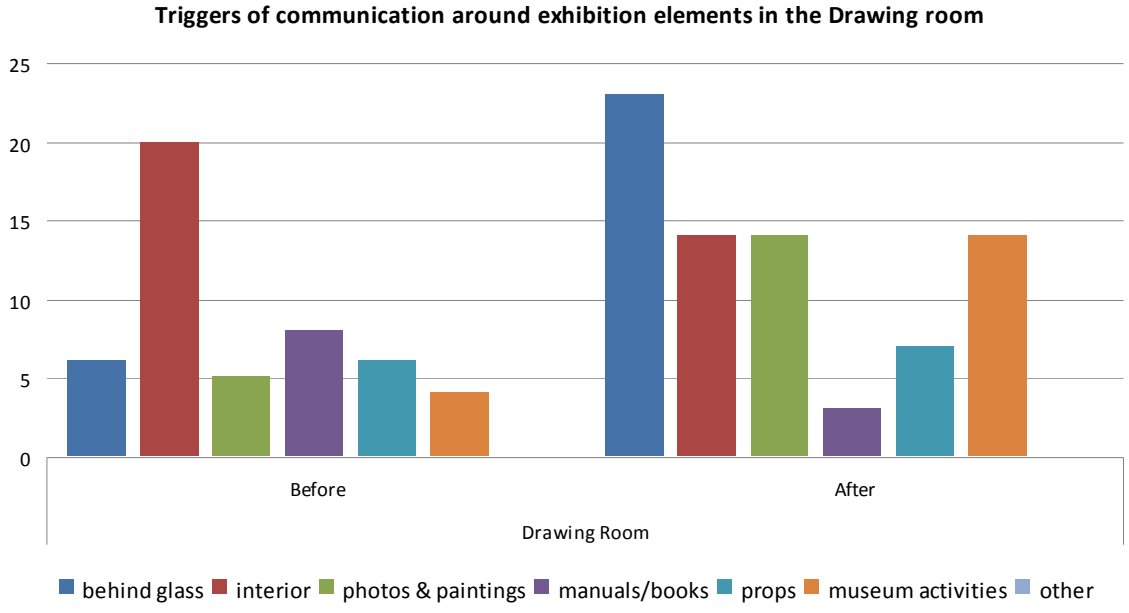

Figure 6.6 Communication around exhibition elements in the Drawing Room before and after the design intervention (in absolute values)

The results above offer evidence to support the idea of designing digital elements so that they draw attention to the objects in vitrines but do not compete with them. This analysis shows also a large increase in the occurrence of the indicators of contact as well as verbal indicators of engagement with the exhibition space, in particular with objects in vitrines.

6.1.5 *FOSTERING INTERGENERATIONAL INTERACTION*

In general, visitors observed reacted positively to the digitally enhanced spaces in the Dining and the Drawing Rooms. The following trends were identified in the behaviour of participating families regarding the micro spaces.

Visitors, even adults, displayed conscious and unconscious imaginative reactions to micro spaces. They tended to interpret the museum space in a creative way, not always based on facts presented. Micro spaces were often associated with magic, ghosts or animated objects, as in the example of the following conversation around the Dancing cup (cf. OS A63, DVD § 8.4.6):

> Father: The cup is rattling.
>
> Grandfather: A ghost!
>
> Father: Look boys!
>
> Boy: It's not a ghost! How does the cup move?
>
> Grandfather: That's a ghost!
>
> Father: Leprechauns!

Sometimes visitors became convinced that they had seen more than was actually presented on display. One example is a conversation between grandparents and a granddaughter (cf. OS A72, DVD § 8.4.6). It is important to note that the porcelain picture of the Victorian town (Figure 6.7), which is the subject of this conversation, does not depict horses. This object was supplemented by light and sounds of horses walking on a stone street.

> The family spends most of their time in the room looking at objects in cabinet containing the Worcester Porcelain micro space.
>
> Grandfather: Hear the horses?
>
> Grandmother: Yes, they are on the picture.
>
> Girl: I can see them, and the seagulls.

Figure 6.7 A porcelain picture of a Victorian town

The purpose of the design intervention was not to create digital elements which stand alone but to enhance objects already on display. This was observed to work very well in the case of micro spaces in the Drawing Room, where the enhancements were created in immediate proximity to museum objects. In the Dining Room, where some micro spaces were spatially removed from artefacts, connection making was observed to be slightly disrupted. The following conversations illustrate examples of verbal communication around micro spaces.

(cf. OS A18, DVD § 8.4.6)

Father: There is a butterfly on the wall.

Boy: Yeah! Is it the one like on the plate?

Father: Yes, I think so.

(cf. OS A19, DVD § 8.4.6)

Girl A: Look, there's a butterfly!

Girl B: Where is it?

Girls A: It's upstairs!

Mother: It's not. It's the projection here.

Girl A: No, it's upstairs, where the mice are [the Nursery Room on the first floor].

It was observed that the micro spaces were also starting points of conversations between adults and their children, even between those who otherwise remained silent. Children tended to notice the micro spaces first and their emotional, often verbal, reaction would draw the attention of other members of the family, as in the following account of a situation in the Drawing Room (cf. OS A81, DVD § 8.4.6).

> Girl (c.2) notices the music and light in the barking dog cabinet. She comes up to the vitrines but does not see the source of the sound. Girl: "Woof! Woof!" Father shows her the dog: "Look, there is a dog. It's barking". Girl jumps around, copying dog's noises. Father picks her up to show her other figures on display.

Occasionally these conversations did not concern the object itself but the technology behind the micro spaces, e.g. as in the dialogue overheard in the Drawing Room between father and his son (cf. OS A52, DVD § 8.4.6). Both of them remain silent and do not interact with one another until they trigger the rattling cup.

> Boy with excitement: Look at that! It's cool!
>
> Father: Oh yes!
>
> They observe the moving cup for a while, laughing.
>
> Boy: Where is the sensor?
>
> Father: I think it's infrared.
>
> Boy: What's the point of that?
>
> Father: To make it more attractive, isn't it?

Some adults, however, ignored children's remarks on micro spaces. These were often underlined by comments of disinterested or disbelief: "Yeah, yeah", "Oh, really?"

Before design intervention, the Dining and the Drawing Rooms were often omitted by visitors. There were also no accounts of visitors returning to those rooms. During final observations, it was observed that some family groups came back to the Dining and Drawing Rooms after visiting the whole museum to see the enhanced objects again. This

had not been observed before design intervention and was regarded by museum workers as a major success.

6.2 Analysis of additional sources of data

In order to supplement and validate the main body of data gathered during in-gallery observations, two other sources of data were used: interviews with visitors and field notes from the site. In the following section a qualitative analysis of the information gathered is discussed.

Interviews were conducted as an additional source of information on visitors' impressions of the digitally enhanced exhibition space. 21 family groups consisting of at least one child and one adult were interviewed immediately after their visit in the Dining and the Drawing Room. When possible, visitors were observed during their visit and the field notes were completed. A question sheet was prepared to provide a frame for flexible semi-structured interviews (see Appendix § 8.2, p.201), and included questions on personal likes and dislikes, account of conversations recalled, elements of exhibition pointed out to other members of the group, and unexpected parts of display. All of the interviews were carried out in the corridor connecting the Dining and the Drawing Room. Interviews, with participants' consent, were audio recorded. This allowed subsequent transcription and analysis (for interview transcripts see Appendix § 8.3, p.202). The field notes were linked with corresponding interviews. It has to be noted that visitors had difficulties in recalling their visits, even when prompted visually while walking the interviewer through the room. For that reason, and the relatively small sample size, it is impossible to draw any generalised conclusions from these data sources. They do, however, corroborate with the outcomes of data analysis of final observations providing further support for the conclusions drawn.

As already observed, in general, child and adult visitors expressed positive opinions about both rooms. When asked, if anything particularly surprised them in the exhibition space, most children talked about digitally enhanced objects, especially the butterfly animation from the Dining Room and the barking dog from the Drawing Room. Adult visitors mentioned the micro spaces if they had been to Bantock house before but had not seen the spaces during previous visits. New visitors expressed surprise at the size of the room and the condition of the original interior design. The importance of being able to touch the elements of display was stressed by several visitors, e.g. (cf. Interview (IN) 19, Appendix § 8.3, p.202):

> Girl: (…) and like how you could sit on things because in Museums it says "do not sit" and "do not touch".
>
> Grandfather: (?) y'know I mean, you go to places and you can't do how everything is cordoned off. That's a surprising thing in here.
>
> Girl: There are all barriers around everything.
>
> Grandfather: There is.
>
> Girl: In here you can touch everything like at home. I like it.

Regarding likes and dislikes about the rooms, most adults talked about the well preserved interior and the atmosphere of the rooms, which allowed them to imagine life and people in the past, e.g. (cf. IN 17, Appendix § 8.3, p.202):

> Interviewer: Do you recall speaking to one another while you were in the rooms?
>
> Mother: Just really showing the children what was there, really.
>
> Grandmother: Explaining things, the different times and what it was like living there. Having no TV to watch, so even reading, didn't we? Yeah.

Some adults admitted that during the visit they had imagined former residents of Bantock House using these rooms or had expressed a wish to own and live in such a house themselves. Children, on the other hand, tended to concentrate on activities and details, e.g. elements of decoration or particular objects, including enhanced ones. For example, a

nine-year-old girl remembered turning the attention of other members of her family to elements of the exhibition as follows: “I pointed out the butterfly and the dog barking. And all these sounds and I think, it’s really good how they’ve done that” (cf. IN 19, Appendix § 8.3, p.202).

When visitors were asked if they recalled pointing anything out to one another, the answers correlated with the outcomes of the final observations (cf. § 6.1.3, p.162). In the Dining Room, visitors remembered pointing out the butterfly animation, manuals, dinner menus, paintings and the grandfather clock. From the Drawing Room, visitors recalled digitally enhanced objects, mainly the barking dog and the rattling cup, as well as paintings and photographs, props and interior design.

The broad subject matters that visitors remembered talking about while in the rooms were: enhanced objects, food and menus, the interior of the rooms (including size, feel and decorative elements) and imagining life in the past. The field notes show that adults and children often engaged with digitally enhanced objects equally long. They carried out conversations around them. During interviews, however, adults tended to distance themselves from the digital elements and concentrated on non-animated elements, such as interior design. Children, on the other hand, were enthusiastic about the micro spaces and mentioned them more often than adults.

6.3 SUMMARY OF THE ANALYSIS

As a result of analysis of initial observations, design goals for development of the digitally enhanced exhibition space were formulated (cf. § 4.5.1, p.123). In the following section, the outcomes of the final observations are discussed in comparison with these goals.

- To bring the attention of child visitors to objects behind glass

There was a significant shift of interest of children observed in the digitally enhanced spaces. Tactile elements of the display (such as furniture) triggered fewer evocations than non-tactile elements, such as paintings and objects displayed behind glass. After the design intervention, there was a large increase in the percentages of child visitors who examined the objects in vitrines (Figure 6.2, p.158).

- To not compete with objects on display

Micro spaces were observed to play a role of eye catcher, which turned attention of participants to objects in vitrines, but were not a distraction. This was confirmed in the interviews, where visitors more often mentioned objects around which micro spaces were created, rather than digital enhancement itself, as for example in this comment about the Drawing Room (cf. IN 23, Appendix § 8.3, p.202):

> Girl: You liked the little dog, didn't you, that barked.
>
> Boy: Like Cassie at home.
>
> Grandmother: Cassie is our dog.

- To enhance non-physical contact

Visitors' emotional reactions of happiness or excitement indicate that some objects in showcases came to life for them. These reactions were often underlined by verbal comments such as "That freaks me out!", "It's moving!", "How did it get here? It's alive!", "Mummy, can you catch it?" One example here is a situation observed in the Dining Room (cf. Field note 4, DVD § 8.4.6):

> A boy likes the butterfly animation. He jumps up and down when it appears. When the butterfly is gone, the boy keeps on looking at the wall and asking "Where's it gone?" The whole family stands near to the wall when it appears again.
>
> Boy: You can catch it Nanny!
>
> Grandmother: I can't. It's not real.
>
> Boy (with disappointment): It's not?! But you can jump and touch it anyway!

This example shows an instance where visitors imagined touching a non-physical exhibition element. A further study with more focus on digitally aided non-physical tactility is recommended.

- To facilitate open-ended exploration of exhibition space

During initial observations, visitors had tended to interact with one another more in the spaces that are designed for open-ended exploration, than in ones that are structured in a more traditional manner. For that reason, it was decided to develop spaces that have no defined goal or task for visitors to complete but are instead process focussed and open-ended. Two types of visitor leading arrangements were developed: micro spaces which created a path that could be followed in a loop were used in the Dining Room and micro spaces which were not connected with one another and could be discovered randomly were installed in the Drawing Room. The space in the Drawing Room was observed to trigger more reactions and interactions than that in the Dining Room. All micro spaces were designed focused on engagement and visitor's reactions to them. This no-right-answer design encouraged free exploration of both rooms and intergenerational exchange of responses. Visitors to both enhanced rooms were more active than before the design intervention. Not only did more of them engage with the exhibition space as individuals, but they also interacted more often with one another.

- To empower the child within a family group

After the design intervention, children were observed to be more verbally and non-verbally active. They led adults to objects that were digitally enhanced and their reactions were often starting points of intergenerational conversations.

- To support adults in their role as teacher, but also encourage them to take on the role of equal play partner

Although adult participants still retained their role as teacher who shows and explains the surroundings, after supplementing exhibitions space with digital enhancement they were more active in new areas connected with emotions and imagination. Data gathered in final observations suggest that adults generated more ideas, shared associations, but expressed fewer facts or pieces of knowledge gained through past experiences. More research is required, however, especially on facilitating caregivers as equal play partners through design of exhibition spaces.

6.4 DISCUSSION OF THE OUTCOMES

The design goals were formulated according to the four categories of indicators of social dream spaces. The comparative analysis of data gathered in stage 1 and 3 suggested an increase in the rate of occurrence of indicators of social dream spaces where they had been infrequent before the design intervention.

After the design intervention, the indicators of contact with objects on display appeared more often, in particular in the case of artefacts in vitrines. The use of subtle digital enhancement was observed to turn the attention of visitors to non-tactile objects in showcases. Contact with artefacts was also indicated by increased time that visitors spent in the digitally enhanced rooms and in the increase of time spent on communicating around exhibition elements. This was especially evident in the Drawing Room, where open-ended exploration was most encouraged.

Internal indicators of engagement were revealed in interviews, where visitors recalled the enhanced objects rather than their digital enhancement. Comments like “There was a ghost!”, “Like Cassie [the dog] at home” indicate internal associations triggered by enhanced objects.

Frequent occurrence of non-verbal indicators of engagement was shown by child visitors, who, intrigued by digitally enhanced objects, pointed them out to other members of the family. In contact with micro spaces, children expressed their enthusiasm by clapping their hands, jumping up and down or even dancing. The excitement of children was observed to be contagious and often turned the attention of other members of families to the redesigned spaces.

The most significant change was observed in the category of verbal indicators of engagement, in particular of adult visitors. Before design intervention, adults tended to concentrate on passing on factual information and take on the role of teacher. After the design intervention, it was observed that verbal communication of adults included more expressions of personal experiences and sharing of ideas. These led to an increase in intergenerational conversations around objects on display.

To summarise, the results of the analysis demonstrate that the design intervention contributed to an increased occurrence of indicators of social dream spaces in previously neglected exhibition areas.

7 CONCLUSION

This concluding chapter reflects on the main areas covered in this research, discusses the original contribution to knowledge this study has made, outlines research limitations and suggests possibilities for future research and practice.

7.1 SUMMARY OF RESEARCH

This research has investigated ways of encouraging the engagement of child visitors with artefacts through the design of digitally enhanced exhibition spaces. It has questioned the preoccupation of current museum practice with knowledge acquisition and the designing of digital elements in detachment to artefacts. The study has, therefore, investigated ways of initiating contact with objects on display through fostering personal and social aspects of visitors' museum experience, with particular focus on children in family groups. Through theoretical and empirical investigation including design practice, this research has aimed to answer the following research question: How can the digital enhancement of a conventional exhibition space foster the engagement of children within family groups with objects on display?

Through the literature review in chapter 2, current conventional exhibition practice was examined in regard to the visitor-object relationship and ways of supporting it. Three key strands were brought together in order to describe the research context. These are namely: the museum artefact as a starting point of action, the child as a museum visitor and digital enhancement as a means of fostering engagement. The review revealed a lack of encouragement for object-centred social interaction in the design of digitally enhanced exhibition spaces. Models used to date concentrate mainly on the cognitive qualities of a museum visit. In contrast, this study focused on the personal and social aspects of a museum experience, which are largely neglected in exhibition design practice. For this reason, a new human-object engagement model was devised. On the basis of the dream space identified by Annis (1986), with the addition of a social context, the Social Dream

Spaces model was developed. This new model concentrates on individual responses to engagements with material things that are shared between visitors and therefore influenced through a social union created around artefacts. Although it has been shown that social dream spaces are inconspicuous formations that cannot be measured directly, it was possible to identify several indicators: internal, non-verbal and verbal indicators of engagement as well as indicators of contact. Consequently, this model served as a framework for developing the design intervention and subsequent comparative study in order to examine the research question empirically.

Chapter 3 presented the research methodology, which took the mixed methods approach. It outlined the indicators of social dream spaces, their characteristics and methods of investigation. It showed how those indicators were used to collect, organise and analyse data in a systematic manner. The experiential character of the Social Dream Spaces Model suggested the use of a qualitative perspective, in both data collection and analysis. This was supplemented through the collection of quantitative data in order to provide a broader picture of the research subject. The chapter outlines the combination of ethnographically-informed research methods (Segelstroem 2009; Denscombe 2010; Clark & Moss 2011) with design intervention within the overarching methodology of action research (O'Brien 2001; Noakes 2010). The practical enquiry was divided into three stages: initial observations of the exhibition space, supplementation of the space with digital enhancement and final observations in the altered space.

Chapter 4 presented the analysis of data gathered at Bantock House Museum, Wolverhampton. Information on children's responses to the mainly non-interactive and static exhibition was gathered before the design intervention. It was concluded that indicators of social dream spaces were particularly frequent in rooms designed to enable physical contact with exhibition elements and to encourage open-ended exploration of the space. Moreover, adults tended to concentrate on the cognitive aspect of a museum

visit, whereas children were observed to be more spontaneous in sharing immediate, emotional responses. They also responded most often to large and/or tactile exhibition elements (e.g. suit of armour, billiard table, costumes). This corroborates the findings of research by Anderson *et al.* (2002, pp.221-222), where these objects were shown to be most memorable. The comparatively frequent emotional responses of children to the exhibition confirmed the appropriateness of the Social Dream Space Model for use in child-orientated designs. The analysis of data gathered confirmed the initial assumption that objects in vitrines were the exhibition elements most neglected by children. This enabled their identification as suitable targets for digital enhancement.

Chapter 5 developed the concept for the design intervention, a digital enhancement of the existing exhibition, which was based on the Social Dream Spaces Model and on the findings of the initial observations. As a prototype, six micro spaces were developed to enhance museum objects which had been identified as neglected by child visitors. These were implemented in two museum rooms and tested with users. The chapter also outlines the approach taken to designing subtle and non-intrusive digital enhancement in a heritage site context.

Chapter 6 includes comparative analysis of data gathered before and after the design intervention. The results of this study support the use of digital enhancement to foster children's engagement with artefacts. From the data gathered, it is clear that non-intrusive digital enhancement can be effective to that end. Child visitors were more verbally and non-verbally active in redesigned rooms. The high responsiveness of children to the spaces was often observed to strengthen their position within the family group, where they took the lead in the exploration of the exhibition. Furthermore, data gathered suggested that the use of the Social Dream Spaces Model in designing the digital enhancement led to a significant increase in intergenerational communication, which was observed to be based not only on facts presented in the exhibition, but also on visitors'

imaginative interpretations, ideas and associations. The chapter concluded that this in turn led to an increased engagement of family members, particularly children, with objects on display.

Digital enhancement was used in this research to create non-physical contact with material objects. In such a way, artefacts can function not only in the object-information package (Dudley 2010, p.3), but also as a source of multi-sensory experiences for visitors of all ages. Such personal engagements were observed to lead to social interactions between members of family groups, even around objects that had been previously neglected. This research investigated and showed the potential of digital enhancement to shift focus back to physical objects with a strong emphasis on their impacts on people (Dudley 2010, pp.3-4).

The results of this study enabled the research question to be answered as follows: the digital enhancement of a conventional exhibition space can foster the engagement of children within family groups with objects on display in the following ways:

- By drawing visitors' attention to objects that were previously neglected and enhancing the sociability of those artefacts.
- By providing subtle, non-intrusive attractors whereby emotional, imaginative and physical reactions to objects are fostered.
- By creating spaces of engagement with objects that can be experienced with other people.
- By creating an environment where family members are more willing to express emotions, associations and imaginative interpretations.

7.2 SET GOALS: PERSONAL REFLECTION AND EVALUATION

The design brief (cf. § 4.5.1, p.123), formulated as a result of the initial observations, set out several goals which challenged my design thinking, understanding of the exhibition

making process and approach towards visitors, especially children. This section presents some personal reflection on those goals and evaluation of how they were achieved.

Engaging child visitors with objects in vitrines is a design challenge, which required novel application of digital enhancements to the exhibition space. Utilising the Social Dream Spaces Model, where visitors engage only with objects that are suggestive to them, digital augmentation was used to amplify physical or imagined features of artefacts and by doing so catch the attention of visitors. After the design intervention, objects behind glass were noted as some of the most evocative elements of the display, illustrating the successful realisation of this goal. In contrast to more commonly applied solutions, such as touch tables and hand-held guides, non-intrusive, subtle designs were used in this study in order to avoid competition with artefacts on display. This demanded a careful weighing of technology applied in the exhibition space and the tailoring of bespoke enhancements of individual objects. Focusing on artefacts brought them to the foreground of the museum experience and made them more evocative and more sociable, especially in the Drawing Room, where visitors often referred to objects themselves and not the micro spaces around them.

In order to enhance non-physical contact with objects in vitrines, I utilised the components of social dream spaces in the design process, i.e. emotions, imagination, memories and thoughts were considered as vital elements and inspirations. This necessitated a change in the design approach. Instead of delivering the information to the audience through innovative technology, I sought possibilities for the visitors to personally connect with the objects by evoking their own emotions, memories and thoughts. This was achieved by facilitating open-ended exploration of the exhibition space, where visitors were put in charge of their own visit, and by giving up control over what was happening and how it was perceived. The enhanced artefacts were more evocative and triggered more communication between visitors than before the design

intervention. This reduced the barrier between visitors and objects in vitrines and facilitated children's contact with them. Moreover, open-ended design supports children's keenness for discovery and mystery, which catches their attention and provokes them into action in the exhibition space.

Although often neglected as a target visitor group in the designing of exhibitions, children are an extremely satisfying group to design for. Their nature as explorers opens a space for spontaneity, playfulness and experimentation. Children are more eager to try things out and respond with more curiosity and wonder to unexpected elements of the display than adults. They also give instant and honest feedback, which is very valuable to the prototype design process. Children's reactions, possibly because of their emotional character, are contagious. Empowered by designs addressed to them, children lead other family members through the exhibition and provoke responses from them. Adults, on the other hand, tend to stay in the role of facilitator to children and are reluctant to play in the museum context. By connecting with children as the main design target group and using adults' role of facilitator, it was possible to find solutions that appeal to all family members and engage them with objects on display on different individual levels. Through supporting the characteristics of visitors, rather than trying to change their behaviour, a bridge was created between family members around museum objects.

The goals set out in this project were found to be useful in the investigation of facilitating children's engagement with objects on display through design of digital enhancements. They led me to solutions that use the technology not as a goal in itself, but as a tool that supports personal encounters with artefacts. This method of facilitating engagement was suitable for child visitors and improved their personal contact with the museum collection. Pursuing the design goals helped me to develop a new approach to exhibition design, where theory (research) and practice (design) are closely interwoven to achieve research/design aims. In this approach the museum is seen holistically, i.e. as a

combination of a collection-based institution and its influence on people. The key element is the understanding of the needs and goals of the different parties involved, which can be developed through engagement in observation, participation, conversation and collaboration.

7.3 RESEARCH CONTRIBUTION

This study makes several contributions to exhibition design research. Firstly, existing research on the use of digital technologies in the exhibition context concentrates mainly on the interaction between visitors and digital exhibition elements and on visitor learning through this interaction. This study, in contrast, offers a new approach by focusing on the influence that digital enhancement has on visitor engagement with objects.

Secondly, a new conceptual model of human-object engagement in the museum context was created: the Social Dream Spaces Model, which focuses on visitors' personal responses evoked by artefacts on display. To design for social dream spaces means to take an approach to the design of exhibition spaces where experiencing and communicating memories, emotions, imagination, fantasies and thoughts are taken as vital design elements. This study found that the model is useful in designing digitally enhanced spaces that foster the relationship between children, their families and museum objects.

Thirdly, through the comparative analysis, this study contributes to the knowledge base of exhibition design and museum studies, in particular audience research. It leads to a better understanding of visitors' interaction with and within exhibition space and how this can be supported by design. The study delivers a rich data collection on visitors' responses to both conventional and enhanced exhibition spaces, with a particular focus on elements that influence the establishment of connection between children and objects in showcases. This is of use not only to exhibition designers and researchers, but also to

museum professionals working with child visitors and their families, e.g. museum educational departments.

Fourthly, in regard to the field of exhibit and interaction design, through the design intervention presented above, this study offers practical examples of digital elements that foster engagement with artefacts through imagination, emotion and communication. The study revealed the potential of treating digital enhancement as a tool to support non-physical contact with artefacts and emphasised the role for such non-intrusive designs in facilitating intergenerational interaction through and around museum objects.

In the evolving landscape of exhibition design, where increasingly many digital elements are introduced in order to attract the audience, the need exists for research that explores the influence of digital enhancement on visitors' contact with objects on display. In this context, this research makes an important contribution to knowledge in the field of museum design practice. It demonstrates that it is possible to create digitally enhanced spaces where the balance between different exhibition elements is maintained in order to foster children's engagement with material objects.

7.4 Research limitations

As this study was carried out in one particular museum, some of the specific findings may not be transferable to all museums, particularly those which differ greatly in size and character with the research venue. Many of the principles used and tested in this work will, however, be directly transferable, such as the theoretical model of social dream spaces and its application to the design of exhibitions. This study introduces the idea of using digital technology to enhance the evocativeness of existing objects rather than creating standalone exhibits, which are evocative in themselves. The limitation in this approach is that all of the micro spaces designed in this study are object specific and cannot be transferred to other objects or venues without modification. That being said, the concept of the micro space itself is transferable as it allows the creation of bespoke

enhancements for conceivably any object or collection. Finally, while the small scale study carried out in this research was appropriate to the type of information sought, i.e. mostly qualitative, it is recommended that further research be undertaken in other museums in order to compare outcomes and test their transferability to other collection-based institutions.

7.5 RECOMMENDATIONS FOR FURTHER RESEARCH AND PRACTICE

The study of digital enhancement for children's engagement with museum objects is of relevance for both practitioners and scholars in the fields of exhibition design and museum practice.

In the field of exhibition design research, future scholars and practitioners may utilise the outcomes of this study by applying the Social Dream Spaces Model in their own practice. This model enables a new approach to exhibition making, where focus is on engagement with the exhibited artefacts. From this perspective, technology is seen as a tool to foster engagement rather than solely to deliver information. Such an approach might be employed by interaction designers, curators and artists in order to foster communication with the audience. While this study provides the theoretical model, further practice-led research might explore specific aspects of:

- Designing exhibition spaces that promote collaborative models of cross-generational interaction,
- Promoting digitally aided non-physical contact with objects displayed behind glass,
- Non-intrusive ways of leading visitors through the exhibition space,
- Ways of supporting caregivers as equal players through the design of museum spaces.

This research also offers a base for further design developments in the area of non-intrusive digital enhancement in the museum context. Designers of exhibits could build

upon the micro spaces presented and tested in this research to expand their own design practice and by doing so create a new range of exhibits, that are object-centred.

By encouraging social interaction with and around museum objects via the means of digital enhancement, which is driven by the conceptual model of the Social Dream Spaces, this research contributes to the knowledge base of exhibition design and museum studies. It suggests that by taking personal and social aspects of the museum experience into consideration during the process of designing exhibitions, it is possible to create spaces that initiate meaningful encounters between children, their families and artefacts. This thesis has also explored the potential of utilising digital technology to enhance engagement in the conventional exhibition context. It has shown that digital enhancement, designed in a subtle and non-intrusive way, can be used as an effective tool to create non-physical contact with artefacts.

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8 APPENDIX

8.1 RECORDING SHEET TEMPLATE

Date:_____ Researcher: _____ **Time:** _____ P**lace**: Drawing Room | Dining Room

Prototype testing - observations

Q1. Time spent in the room (first member of group enters until last member of group leaves):_____

Q2. If the visitors look at the objects in glass cases, how long (give approximate time in min)?_____

Q3. How much time do visitors spend communicating around objects (give approximate time in min)?____

Q4. If any, which objects make people interact with one another?

Q5. Number and age of visitors in an observed group (M – Male; F - Female)

Children	**Adults**
0-3	Older siblings
4-6	Parents
7-9	Grandparent
10-13	Teacher
13-16	Other

Q6. Remarks (e.g. objects of interest/comments/reactions/spontaneous reactions):

Q7. Do the visitors interact non-verbally (tick all that apply)**?**

- Bringing others to the object
- Pointing things to one another
- Smiling
- Other (please specify):

Q8. Do the visitors interact with exhibition (A- Adult; C - Child)**?**

- Look at objects in glass cases
- Look into drawers
- Read manuals/books
- Play with toys
- Try costumes on
- Handle objects on display (incl. Furniture, textiles)
- Observe paintings
- Other (please specify):

Q9. If visitors talk, what do they talk about? Child (M/F, age); Adult (M/F, age)

	Child 1	**Child 2**	**Child 3**	**Adult 1**	**Adult 2**	
Ask questions						
Facts						
Emotions (e.g. give out noises of admiration, disgust, "I like it…" , "I would like to have it…",etc.)						
Experiences / Memories						
Ideas / Imagine, if…						
Associations (e.g. it looks like…)						
Other (please specify):						

8.2 INTERVIEW QUESTIONS FORM

Interviews

Bantock House Museum – digitally enhanced museum space

The interviews will last 5-10 minutes depending on the discussion and will be held in groups (2 person plus).

Hello, we are doing an evaluation of the Dining Room and Drawing Room. Could you spare a few minutes to answer some questions? All interviews will be anonymous. Neither your name nor the name of your child will be used. By participating in this interview you are giving your permission for your answers to be used in research and publications.

Questions:

1. **What is your age? Have you been to Bantock House before?**
2. **Did anything in particular surprise you about the Dining or Drawing Room?**
3. **Is there any element that you particularly liked or disliked in the Dining Room today?**
4. **Is there any element that you particularly liked or disliked in the Drawing Room today?**
5. **Do you remember pointing things out** (bringing others to these things) **to one another while you were in the rooms? If yes, can you remember what that was?**
6. **Do you remember speaking to each other while you were in the rooms? If yes, can you remember what you spoke about?**
7. **While in the rooms, was there anything that you found out about each other that you didn't know before?**

Thank you very much for speaking with us. Can I just ask one of you to fill in this form (release form) so we can use your evaluation in the research?

8.3 INTERVIEW TRANSCRIPTS

Abbreviations in use:
IN – interviewer
FP/MP – mother/father
FG/MG – grandmother/grandfather
FS/MS – female/male adolescent sibling
FA/MA – female/male adult
Fx/Mx – female/male child of x-years of age

Interview number: 01 | Timing: 2:10 min | Date: 05 April 2012 | Interviewer: Adam

What are your ages and have you been to Bantock House before?
MG: Yes I've been. Yes, we've all been.
FG: Yeah.
MG: Sixty six
FG: Sixty four
F8: Eight

Did anything in particular surprise you about the Dining or Drawing Room?
MG: What did you think was surprising in the rooms?
F8: The music?
MG: The music in the Drawing Room.
FG: Yeah, sound effects.
MG: Sound effect in there [Drawing Room] and the…
F8: Butterfly
MG: the butterfly in there [Dining Room]. And the clock. We liked the clock, didn't we?

Is there any element that you particularly liked or disliked in the Dining Room today?
MG: Nothing I disliked. I think, it's quite spacious, so you can get round. You can walk round and see the pictures. You can get through everything.
F8: That room [Dining Room]. Butterfly.

Is there any element that you particularly liked or disliked in the Drawing Room today?
MG: What did you like?
F8:The dog
MG: The little statue of the dog

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what was that?
MG: Yes, the sound.
F8: The butterfly.
MG: The carpet, cause you walked on the carpet.
F8: And the big chair.
MG: Oh yes, the big chair. You [F8] pointed that out. And the menu. And the sheep and the dog on the picture.
F8: And the mountains.
MG: And the mountains

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?
[All laugh]
FG: The butterfly! [Laughs]
MG: Exactly! [Laughs]

Interview number: 02 | Timing: 2:10 | Date: 05 April 2012 | Interviewer: Adam

What are your ages and have you been to Bantock House before?
FG: Seventy five [pointing MG], seventy [pointing herself], eleven [pointing F11] and nine [pointing M9].
MG: Grandchildren [pointing at M9 and F11].
FG: We've been before. We have been [pointing at M9 and F11].

Did anything in particular surprise you about the Dining or Drawing Room?
FG: Emm..
M9: They're cosy
FG: Yeah.
M9: Well, it's nice.
FG: As we expected it, isn't it?
F11: Yeah.

Is there any element that you particularly liked or disliked in the Dining Room today?
FG: The Dining Room…
F11: No…
M8: No.
FG: Ahmm…What do you think?
MG: No..
FG: It's good to see the books, wasn't it?
MG: Yes
FG: We talked about the books.
MG: The books. It's interesting. Yeah, yeah.

Is there any element that you particularly liked or disliked in the Drawing Room today?
FG: No, I loved it. [laughs]
M8: Yeah, I like this room.
FG: I could live in it myself.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?
FG: You told me about the children.
MG: Children, yeah.
FG: Eleven children.
MG: Eleven children.
FG: I think that's it.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?
M9: Yeah.
FG: [Laughs]
MG: We spoke about the…
FG: The
MG: and the daughters
M9: And the pictures.
FG: We spoke to the children about the pictures.
MG: And there was that … What I saw, I can't see it now.
FG: The butterfly up there [pointing Dining Room].
MG: Yeah, that was it.

While in the rooms, was there anything that you found out about each other that you didn't know before?
FG: No.
MG: No.
FG: Did you? [to children]
M9: I know….now.
F11: [Laughs]
FG: Anything? [to F11]
F11: No.

Interview number: 03 | Date: 11.04.2012 | Timing: 2:39 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?
FP: Yes, we have. [Pointing herself] 30, [Pointing MP] 29.
F13: Thirteen.
F9: Nine.

Did anything in particular surprise you about the Dining or Drawing Room?
[Children laugh.]
FP: No.

Is there any element that you particularly liked or disliked in the Dining Room today?
FP: Ehmmm…I like the furniture. This, the chair and the table… Anything you like?
F9: I liked the ceiling.
FP: The ceiling.
F9: The details.
FP: Yeah, very detailed.

Is there any element that you particularly liked or disliked in the Drawing Room today?
FP: The only thing that I disliked is the fireplace. I don't like the tiles. Yeah [laughs], I don't know why, I just don't like them. But again the details on the walls and…and the ceiling was lovely.
F9: And I liked the furniture.
FP: You liked the furniture.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?
FP: They've been given these questionnaires that they've been given. So they've looking for these various things that were there and trying to find them in the room. One of the things she couldn't find was actually a tile, wasn't it? What she's now found.
F9: The tile? No! It was a… in the Drawing Room.
FP: Oh, sorry sorry.
F9: What's the picture name? Just didn't find that.
FP: Didn't find that.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?
F13: The details.
FP: About the details of everything.
F9: Anything in particular.

While in the rooms, was there anything that you found out about each other that you didn't know before?
FP: Probably that the children are quite interested in the details in the ceiling. Whereas I wouldn't have thought that they would be. They liked things that I wouldn't have thought that they liked.

Interview number: 04 | Date: 11.04.2012 | Timing: 3:36 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?
FP: I'm 44.
FG: And I'm 66 and I 'ave been in the Bantock House before, 'bout 2 or 3 years ago and they came with me and they were all smaller. You're 7. [pointing at F7]
F9: I'm 9.

Did anything in particular surprise you about the Dining or Drawing Room?
FP: the butterfly was a bit of a surprise.
FG: [Laughs]
FP: the projected butterfly
In: You didn't expect it?
FP: No.
FG: No, nor the dog barking.
FP: and the dog barking.
FG: Yes.
FP: Nice to hear the sound and the music. And it's nice to be able to touch and sit down and y'know.
FG: And the album.
FP: The albums are lovely.
FP: It's lovely to be able to look through the album in the Dining Room
FG: and to show the children. Y'know. Cos they're the ones (?)
FG: What about you? What did you like?
F7: The butterfly.
F9: I like the music in the Drawing Room and I liked the butterfly.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?
FP: The album.
FG: The album yes.
In: In the Dining Room?
FG: In the Dining Room yes.
In: Anything else?
F7: Butterfly.
FG: Yes the butterfly yes. [laughs]
FP: I think the general look of the house, as well , to be able to , y'know (?) when they're little.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?
FP: [laughs] The curtains [laughs]. And the furniture.
FG: The furniture yes yes the beautiful furniture. And furnishings
FP: And Abigail, you wanted me to go the fireplace because it said smile you're on camera.
FG: Oh yeah. [laughs]
FP: It was a nice touch. Showing people that you're on video in a humorous way.
FG: In a humorous way.

While in the rooms, was there anything that you found out about each other that you didn't know before?
FP: Us? No.
FG: I'm thinking about the album because there's twins, and it's a boy and a girl, and they're dressed the same. And I said, "could you imagine now boys and girls dressed the same?". Ya wouldn't know the difference between a boy and a girl. which we wouldn't do today, would we?
F9: Well kind of because she has trousers
Adult: Well, no it's not the same
F7: Boys don't wear dresses
FG: [laughs]
FP: No Boys don't wear dresses now.

Interview number: 05 | Date: 11.04.2012 | Timing: 2.41 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F8: Yeah, we've been.
F8: I'm eight.
M13: Thirteen

Did anything in particular surprise you about the Dining or Drawing Room?

FG: Oh projections.
M13: There was a projection. The butterfly.
IN: You didn't expect that there? Why?
M13: It's not from that time period.

Is there any element that you particularly liked or disliked in the Dining Room today?

IN: Any elements you liked very much?
M13: I like the bull around the outside.
FG: The what?
M13: The bull
F8: Yeah, I liked the curtains.

Is there any element that you particularly liked or disliked in the Drawing Room today?

FG: We really, we really//
M13: The money
FG: Oh yes, we liked the money in the box. The cash box. I really liked the table in the window. I could imagine sitting and looking out into the garden. I really liked that bit.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: Yes.
M13: I pointed out the money.
FG: Yes, the money.
F8: The photo.
FG: The photo.
F8: The photo by the noise.
IN: The nice photo? In the Drawing Room? The one that makes sounds?
FG: Makes sounds, yes, and the photographs, we liked looking at the photographs of the people, don't we, and the ladies dresses, what they used to wear in the old days.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

M13: Tea.
FG: Sorry?
M13: We spoke about having tea and biscuits.
FG: [Laughs] He's obsessed with food. [Laughs] We talked about the money and the bull
M13: And the writing
FG: The what?
M13: The menu.
FG: The menu.

While in the rooms, was there anything that you found out about each other that you didn't know before?

FG: Each other? No, I don't think so not about each other no.

Interview number: 06 | Date: 11.04.2012 | Timing: 1.39 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

MP: Yes. Forty six.
F8: Yeah. I'm eight.

Did anything in particular surprise you about the Dining or Drawing Room?

MP: No, not really.
F8: No.
IN: No surprises?
MP: No.

Is there any element that you particularly liked or disliked in the Dining Room today?

MP: You liked doin' the little quiz, didn't you?
F8: Yeah. I liked the bottle.
IN: The bottle.
F8: Yeah.
IN: Did you play the bottle? The game?
F8: Yeah.

Is there any element that you particularly liked or disliked in the Drawing Room today?

MP: Not really no, I just liked looking.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

MP: I don't know. I just looked round.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

MP: Not really. We did speak but we didn't… I don't remember

While in the rooms, was there anything that you found out about each other that you didn't know before?

MP: No, not really.

Interview number: 07 | Date: 12.04.2012 | Timing: 1.14 | Interviewer: Rob

What are your ages and have you been to Bantock House before?

FG: I'm in my fifties
FP: I'm 32
FG: David is four, aren't you? How old are you, Ethan?
M7: Seven.
IN: Have you been to Bantock House before?
FG: Yes, we have. Several times.
M7: I've been here two times with my family and my school.

Did anything in particular surprise you about the Dining or Drawing Room?

FG: The children liked the butterfly on the wall and they noticed the cup moving in there. So that was different to when we've been before.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

IN: Did you talk about anything else while you were in the rooms?
M7: Yeah, all the pictures.
FG: They were doing that detective thing. They were looking at the pictures.

Interview number: 08 | Date: 12.04.2012 | Timing: 2.31 | Interviewer: Rob

What are your ages and have you been to Bantock House before?

FG: Five, seventy-four and seventy-six

Did anything in particular surprise you about the Dining or Drawing Room?

FG: The butterfly. That was a surprise, wasn't it?

Is there any element that you particularly liked or disliked in the Dining Room today?

FG: Nothing really to dislike. Nothing to dislike about the rooms, was there?
IN: Anything you liked? The butterfly or the pictures?
FG: I said the butterfly, didn't I?
F5: I liked the butterfly.
FG: You liked the butterfly. [to f5]

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: The menu, didn't we? We looked at the menu and the pictures.
MG: It made us feel hungry
FG: [Laughs]
FG: And the pictures and the menus and the fireplace. What else did we see?
MG: Sheep, cows.
FG: The cow at the window. Anything else?
F5: In one of the fields I saw something flashing, granddad.
FG: You saw something flashing?
F5: In the things where//
FG: Oh did you?
IN: Oh the
MG: In the mirror ---- cabinet
IN: Yeah yeah did you hear the music?
FG: No.
F5: I did.
FG: You did? We're deaf. She did.

While in the rooms, was there anything that you found out about each other that you didn't know before?

FG: No, we've only been in the one room. Nothing new in there.

Interview number: 10 | Date: 12.04.2012 | Timing: 2.31 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FG: [Laughs] Yes, we've been before and we're in our fifties.
IN: And you?
F8: Eight.

Did anything in particular surprise you about the Dining or Drawing Room?

F8: The moving cup.
FG: They've added in a few new things like noises and the cup moving in the cupboard to give it a little bit more authenticity.
MG: Or surprises.
FG: Or some little surprises to get us going.
MG: And what did you see in that room? A butterfly?
F8: Yeah.
FG: And you saw a butterfly in that one, didn't you?
IN: So, you didn't expect it?
MG: No
FG: No, we didn't. They were new to us. I don't. We didn't see those last year. No. They're new.

Is there any element that you particularly liked or disliked in the Dining Room today?

FG: What did you like in that room?
F8: The pictures.
FG: You liked the pictures. Anything that you disliked?
F8: Mmm no
FG: No.

Is there any element that you particularly liked or disliked in the Drawing Room today?

FG: I like it in there.
F8: I liked the fireplace.
MG: I liked the cabinets and the plates.
IN: What did you like in the cabinet?
MG: All of the plates. And the teapot.
F8: Yeah.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: It was the butterfly in there, and in there it was the cup and saucer moving, wasn't it?
F8: Yeah.
FG: [Laughs]

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FG: Yeah we were.
MG: Yes.
FG: It was about the cup and saucer moving.
MG: It's just finding the quiz as well.
FG: And finding the quiz. Of course.

While in the rooms, was there anything that you found out about each other that you didn't know before?

FG: About us? No, I haven't really, have you?
MG: We just learned that this one [pointing to f8] is very quick at spotting things.
FG: is very quick at spotting things.

Interview number: 11 | Date: 13.04.2012 | Timing: 3.00 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FG: Four. She's been about three times.
MP: You've been here before haven't you Morgen?

Did anything in particular surprise you about the Dining or Drawing Room?

MP: Any surprises in the rooms, Morgen? What surprised you just in there that was moving around?
FG: The camera, the cup
MP: Teacup.
F4: The cup
FG: The cup moving. The cup and saucer moving. We thought "wow!"
MP: And the music came on, didn't it?
MP: What did you see on the wall?
F4: A butterfly.
IN: A butterfly? Wow.

Is there any element that you particularly liked or disliked in the Dining Room today?

FG: I wish it were our Dining Room.
F8: We haven't even looked at that room yet.
FG,MP: No, we haven't.

Is there any element that you particularly liked or disliked in the Drawing Room today?

MP: We liked everything, didn't we?
FG: I liked the pictures.
IN: Which ones.
FG: I like all these. I like the family pictures actually. And the pictures are the nicest because it brings home that it was somebody's house, don't it?

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

MP: What did daddy point to on the wall? [to F4] The butterfly. And what else? The tiles and the fireplace. Didn't we?

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FG: The tiles, just the tiles. And the table. Many a meal has been on that table, hasn't it? Many a meal.

While in the rooms, was there anything that you found out about each other that you didn't know before?

FG: No you were too busy reading. [to MP]
I love it. I used to come here when they used to have a library here. It's a hidden gem is this. A lot of people don't know Bantock House, they just think it's a park.

Interview number: 12 | Date: 13.04.2012 | Timing: 6.45 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F7: Seven
FG: And have you been to Bantock House before?
F7: I have
FG: I probably came as a child.
MG: I definitely haven't been.
FG: You haven't been. I definitely came, much like your age, I would have come with the school. I can't remember a thing but I do know we was at Bantock.

Did anything in particular surprise you about the Dining or Drawing Room?

FG: Surprise me? I was pleasantly surprised, as I said to you about the cosiness. Cosy size of it. What about you Neil? The grandparents have ignorantly walked off. What about you?
MG: Me? I've always wanted to come here. (?) What do you mean by surprise?
IN: Something that you didn't expect in the rooms for example.
MG: (?)

Is there any element that you particularly liked or disliked in the Dining Room today?

MG: Yeah, I liked all of it. (?)
F7: I like the butterfly. Where does that come from? [pointing at butterfly]
FG: Magic.
MG: There's a projector
F7: There it is. [pointing at projector]
MG: It's just so they can be more (?) Yeah, it's nice. When you look around you can see what the old generation valued. A bit of architecture rather than slapping pieces of wood together. (?)
FG: I like that room better [pointing to Drawing Room]

Is there any element that you particularly liked or disliked in the Drawing Room today?

FG: I think its cosy. The light. Those panels. There's a lot more break in the panels to me with these windows. That's a lovely aspect. And this again, it draws your eye to that and, of course, you've got a lot of interest going on, haven't you? As well because of that. So that's again. It's not like the headed panelling. It's breaking it up again. I just think it looks more cosy, I suppose. That rug. You could imagine people sitting here chatting. And you could imaging maybe someone watches and just goes off to read a book in the corner or someone, y'know, working out his bills. I think you get more of an impression of what, y'know, activity. Whereas back there it looks simply for eating. Out and out for dining there. Y'know what I mean? A big table. Maybe the women had big gowns, I don't know, because there's certainly big a lot of area going round the table. There's very little in there. Other than. Or particularly warmth in that way that there's warmth in here. The warmth is being touched up by the little touches. Like I said, the rugs and things.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: Yes, I immediately pointed out this aspect straight away. I love the aspect of that window. And I said "Love, you've got the light and you got a lovely aspect". So that was the first thing I pointed out. The first thing that Jeff said was that he thought the curtains were very nice. We walked in and that was the first thing he saw. Because when he looked one of the conflicts is the curtains. It's kind of almost the only soft furnishing, you could say, is the curtains. It is almost. So I think he commented as soon as he walked in. And Lee commented on the huge clock, which wasn't very big to me but certainly very big if you're down here. So she thought the clock was intriguing and of course the butterfly. The thing going there. And I just sort of really picked up on the lamp, I think. I thought the lamp was, y'know just the shape, maybe it feel solid. Other than that I thought it was quite a good set. Functional.
IN: It was a functional room

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FG: We looked at the menu which I thought was nice for farmers, as it were. And Jeff went over there and he said that they had spelt lock wrong-ly. He was of the opinion that it was spelt wrong. I don't know, maybe they spelt it that way. I don't know how it's spelt over there.

Interview number: 13 | Date: 13.04.2012 | Timing: 2.57 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FP: We have, she hasn't. She nine and she's three.

Did anything in particular surprise you about the Dining or Drawing Room?

F9: The way it's designed. The paintings.
IN: Which ones? Do you remember some?
F9: The picture of the girl on the fireplace, I think.
IN: Anything?
MP: Not really, I've been four times.
FP: We've all been here before

Is there any element that you particularly liked or disliked in the Dining Room today?

FP: I like everything
MP: (?)
F9: I like horses
FP: The things on the bottles. The questions for the kids if you want.
FP: I like everything

Is there any element that you particularly liked or disliked in the Drawing Room today?

FP: I like the music. He said "what are you on about, V.?" There it is. It's nice
MP: (?)
FP: It's quite relaxing in there
F9: (?)

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FP: It was the book wasn't it

Interview number: 14 | Date: 13.04.2012 | Timing: 3.22 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F6: Six
F6: No
IN: None of you?
FP: No

Did anything in particular surprise you about the Dining or Drawing Room?

FP: No, I just think it's fantastic that it's all accessible. Nothing is, you can't touch it, you can't (?)
IN: Were there any surprises in the rooms for you?
F6: Not sure
FP: Was there anything that you particularly liked in the rooms?
F6: Which rooms?
FP: All of these rooms.
IN: We can walk there if it'll help.

Is there any element that you particularly liked or disliked in the Dining Room today?

IN: Do you like anything in this room?
F6: I like the table.
FG: I like the tiles. I love the tiles in the fireplace in both rooms.
FP: I just like it actually. It's wonderful.

Is there any element that you particularly liked or disliked in the Drawing Room today?

F6: I like, um, this picture. The king and queen
F6: I like (?)
IN: Did you like the fireplace.
F6: I love the fireplace
FP: I just thought that the cabinet was beautiful, really beautiful.
FP: I love that window

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FP: Yeah we were looking at the china and the menus and all the pictures, the photographs. It brings it to life, doesn't it?

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FG: We said how much we'd like to live here.
FP: We said that the panelling was beautiful and the floors. Yes it all so nicely kept. It looks as if they've just moved out.

Interview number: 15 | Date: 13.04.2012 | Timing: 4.03 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

MG: Yes, a number of times.
IN: What is your age?
M8: I'm eight.

Did anything in particular surprise you about the Dining or Drawing Room?

M8: No.
MG: I was interested in the butterfly that was projected onto the wall. I think that was new. I didn't notice that before.

Is there any element that you particularly liked or disliked in the Dining Room today?

M8: Em, I liked //
MG: I think the ceilings are fantastic.
M8: I agree with my granddad.
IN: You like the ceilings as well? Anything else?
M8: The furniture.
MG: I love the wood panelling. I like, I like wood panelling.

Is there any element that you particularly liked or disliked in the Drawing Room today?

M8: I liked everything in there.
MG: We'd like to take some of the furniture home.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

MG: Some of the porcelain was illuminated with sound effects, the dog barking etc.
M8: Yeah.
IN: Did you like it?
MG: It's good. It's good for children. It calls their interest. For children porcelain is not so interesting. So when you've got the illumination, the sound effects, it's "oh, the dogs barking". It's a good plan.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

MG: Just, how nice and pleasant it was. The quality of the furnishings and the carpet. I wouldn't let him sit or walk on the carpet, anyway, because the less use it gets the longer it lasts.
FG: (?)
MG: It's normal, not to touch, not to walk on the carpets. It's a big surprise.
FG: (?)
MG: We did look. Where it says, "smile", on the writing desk you're being recorded we did look round to see if we could see the camera.

While in the rooms, was there anything that you found out about each other that you didn't know before?

MG: New about us? No nothing new.

Interview number: 16 | Date: 14.04.2012 | Timing: 5.08 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FP: No, we've not
IN: And what is the age of you too?
F10: Ten and six

Did anything in particular surprise you about the Dining or Drawing Room?

F10: Hhmm
FP: Not. For me it was always wondering what the noise was, the noises were in there. There's the projection noises or whatever it was. That's all for me. It was all. Obviously a dog barking. In there it was like insects and things. And I thought "what's that all about?"

Is there any element that you particularly liked or disliked in the Dining Room today?

F10: I liked the books that tell you like the history (?)
FP: I liked the menus. [Laughs] Trying to figure out what they were saying.
F10: What about you dad?
MP: I like the plate service and the book.
IN: Oh, the family.
MP: Yeah.
F10: Yes that nice.
IN: And you? Did you like anything?
F6: (?)
IN: The photos? Okay.

Is there any element that you particularly liked or disliked in the Drawing Room today?

F10: Em.
FP: Oh you like this, don't you Joan?
F10: Hmm. Yeah.
IN: The money box?
FP: Yeah. She liked that. I don't think there's anything that I disliked.
F10: No.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FP: Cos, they were doing the quiz I think, weren't they? What were you pointing out? What were you looking at?
F10: (?)
FP: And the flowers over there, weren't you? And anything else?
F10: We looked at pictures. (?)
IN: Perfect. And in the Dining Room? Do you remember anything?
FP: What were you looking at in the Dining Room?
F10: The pictures of the animals.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FP: Probably [Laughs]
F10: Yeah
FP: Not really, I know I said, "look at the butterfly on the wall" and "why've they got those noises" [All laugh]
IN: Anything else?
FP: We were talking about the menu, weren't we?
F10: The menu, yeah.
MP: We were talking about the tiles on the fireplace, that they look like the one in West Bromwich. Very similar.
IN: Do you like the menu?
FP,F10: Yes
FP: I don't like the rabbit. I've got a rabbit at home and it's like uuuhm. I wouldn't keep some of the things but I know that it was very different. A lot of it was game food and things. Not my, eh, cup of tea really. [Laughs]

While in the rooms, was there anything that you found out about each other that you didn't know before?

MP: Well, we learned that Laura won't eat a rabbit.
FP: Yeah. I don't know really. I suppose, for me, these are very much, they like to look at the things and be busy and I like to sit and study things on my own. I wasn't really listening to you. [to mp]
MP: You never do.
FP: I don't know. What do you think?
F10: I learned about, you know, but, em, I didn't know that the food what they ate was.
FP: No, what did you learn about us? Do you think you learned anything about us?
F10: My dad told me what the animals were in there, and I didn't know.
FP: But what about us as people did you?
MP: She learned that I'm really clever. [All laugh]
FP: Just say "yes".
F10: Yes.

Interview number: 17 | Date: 14.04.2012 | Timing: 1.55 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FP: Yes, yes we have, haven't we?
IN: And what is your age?
FP: Four
IN: And you?
M7: Seven.

Did anything in particular surprise you about the Dining or Drawing Room?

FP: The cup moving. Anything else?
M7: No.
FG: Not really

Is there any element that you particularly liked or disliked in the Dining Room today?

M7: The way they painted the pictures.
FP: He liked the pictures. Especially the cow.

Is there any element that you particularly liked or disliked in the Drawing Room today?

M7: (?)The way you could wave your hand under and make the noise.
FP: The noise, he liked that. And the porcelain.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FP: Oh yes yeah. The porcelain, the different porcelain. The different statues and that, weren't we?

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FP: Just really showing the children what was there really.
FG: Explaining things, the different times and what it was like living there. Having no TV to watch, so even reading, didn't we? Yeah.

While in the rooms, was there anything that you found out about each other that you didn't know before?

FP: No.

Interview number: 18 | Date: 14.04.2012 | Timing: 4.26 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F4: Yes
IN: And what's your age?
F4: Four years old.

Did anything in particular surprise you about the Dining or Drawing Room?

F4: Yes.
IN: What?
F4: I didn't know there was a picture.
IN: The queen and the king?
FP: Is that the Queen and the king?
IN: I think.
FP: Really?
IN: At least it looks like.
FP: I though it was the owners of the house.
FP: You mean this particular house?
IN: Just these two rooms.
FP: For me, it's the first time I walked in this house. I haven't been in these two rooms before.
IN: Ah you haven't been to these two?
FP: No, it's first time. I really like the quality of the furniture. Yeah, I like it. I haven't spent as much time as I would like to to look at details on the dishes. The dishes are interesting. The little ones. And I like you know the light bringing in the house the room especially very nice.

Is there any element that you particularly liked or disliked in the Dining Room today?

F4: I like the bottles.
FP: The bottles?
IN: You liked the bottles? Why did you like them?
F4: Because I thought they were real.
IN: And you can drink from them?
F4: Yes.
IN: Did you play drinking out of them?
F4: Yes. And I
IN: Have you been to this room before?
F4: Yes
FP: She did, last week. Ah, there's a butterfly! [pointing] Oh, it's lovely. That's very nice, yes. I really like the quality of the furniture.
IN: It's one of the butterflies from the plates.
FP: Ah
F4: It's that one [pointing to butterfly on plate]
IN: Yes, exactly
F4: On the plate!
FP: Wow
IN: Can you hear?
F4: Music.
FP: Wow
F4: [Laughs]
F4: I never
FP: You did you do that?
IN: It's animation. I photographed one of those and I animated it.
FP: It really brings the house the room a bit of life.
IN: Yeah.

Interview number: 19 | Date: 14.04.2012 | Timing: 4.14 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F9: Eh nine.
IN: You're nine. And have been to the Bantock House before?
All: Yes.
MG: Three times this week.
FG: Yes, we come here often.
IN: You've come here three times?
FG: Yes, three times with her mum and dad.
F9: This week I've been here three times.
IN: You must have really liked it.
F9: I love it here.

Did anything in particular surprise you about the Dining or Drawing Room?

F9: Um, no. I like how you can open the drawers and see what like the letters and everything. I really like them.
IN: And you?
FG: We just like the layout of it really. Pleasant
MG: It's been well preserved init really. Study in time. We like that. It's different.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

F9: I pointed out the butterfly and the dog barking. And all these sounds and I think It's really good how they've done that.
MG: And they've added a suit of armour in the room down there. Super.
F9: I like it
MG: [Laughs] She likes it.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

F9: I like em//
MG: Well upstairs by the jewellery and stuff//
F9: I like, because in Titanic, they've got them corsets. Because I like Titanic, I saw the corsets upstairs. They're really amazing.
IN: Did you try it on?
FG: Yeah probably.
IN: Do you remember talking about in those, in this room?
FG: The dolls?
IN: No in these, in Dining Room or Drawing Room?
F9: I member talking about like how the paintings have been painted and everything. That was amazing. And I like how you could sit on things because in Museums it says "do not touch" and "do not touch".
MG: I think the surprising thing is (?), y'know I mean, you go to places and you can't do how everything is cordoned off. That's a surprising thing in here.
F9: There are all barriers around everything.
MG: There is.
F9: In here you can touch everything like at home, I like it.

Interview number: 21 | Date: 14.04.2012 | Timing: 2.29 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

F4: I'm four
IN: And you?
F8: I'm eight.
IN: And have you been to the Bantock House before?
MG: Oh yes. We only live down the road. We come here regularly.

Did anything in particular surprise you about the Dining or Drawing Room?

MG: No surprises I suppose. There's not much changing. They've been coming since they were little toddlers. But I don't think they have done any changes, have they?
F8: No.
MG: These have changed. Having these. Cos these weren't here when we first came. Were they? The quizzes.

Is there any element that you particularly liked or disliked in the Dining Room today?

F8: The pictures and the butterfly.
IN: And the butterfly.
MG: Oh where's a butterfly? [they walk to the Dining Room]
F8: There. [pointing to butterfly]
MG: There it is. I haven't seen that. Have you seen it?

Is there any element that you particularly liked or disliked in the Drawing Room today?

MG: You liked the bird didn't you?
IN: Do you also like the birds? Which one do you like?
F4: All of them.
MG: They are interested in birds cos I tend to, I am, so unfortunately they have to be interested in birds.

Interview number: 22 | Date: 14.04.2012 | Timing: 4.10 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

M8: Eight
IN: And you?
M6: Six
IN: And have you been to been to Bantock House before?
M6: No. I don't think so.
FG: Not this one no.
IN: And you two?
FG: Yes we've been many times.

Did anything in particular surprise you about the Dining or Drawing Room?

FG: Oh ho!
M8: The butterfly.
IN: The butterfly.
FG: In that room. What surprised you in that room? [Laughs] What did you see?
M6: The moving cup.
FG: And saucer. The saucer moves as well.
IN: Cool.
FG: Cool. She thinks you're good for noticing that. I didn't notice it. No not until they told me.
IN: Did it surprise you as well?
FG: Sorry
IN: Did it surprise you as well?
FG: I was very surprised, yes.

Is there any element that you particularly liked or disliked in the Dining Room today?

FG: Did you like the butterfly or the paintings or the table?
M8: I liked the paintings and butterfly.
FG: What did you like in that room?
M8: Uuuhh.
FG: Daniel? That's the Dining Room. Go and have a quick look. You can come back and tell us. See if there's anything you like.
IN: Did you like anything?
FG: I love it all.
FG: …..
FG: Did you find anything you liked?
M6: Table

Is there any element that you particularly liked or disliked in the Drawing Room today?

M8: The moving plate, the cup.
M6: Chairs
FG: What did you like? You liked the moving cup. ….
M6: The sofa.
IN: You can sit on it.
MG: See if it's comfortable.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: Oh yes. You pointed out the?
M6: The moving cup.
FG: The moving cup, yes.

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

M8: I remember speaking about the butterfly.
FG: Yes. He told me about the butterfly. And Hugh found the cup and saucer, didn't he?
IN: And grandpa?
MG: (?)

Interview number: 23 | Date: 14.04.2012 | Timing: 3.33 | Interviewer: Kasia

What are your ages and have you been to Bantock House before?

FG: Never
IN: What is your age?
FG: She's eleven and seven

Did anything in particular surprise you about the Dining or Drawing Room?

FG: What was your surprise? What did you get as a surprise?
M7: The butterfly.
F11: That noise in there.
FG: Oh the noise
F11: I think it's a dog.
FG: The painting and the old money

Is there any element that you particularly liked or disliked in the Drawing Room today?

F11: You liked that little dog, didn't you, that barked.
M7: Like Cassie at home.
FG: Cassie is our dog. And you found your name on one of the paintings didn't you? Cartwright, it was on one of the paintings.

Do you recall pointing things out (bringing others to these things) to one another whilst you were in the rooms? If yes, can you recall what that was?

FG: They were looking at the bureau with the (?) [Laughs]
FG: The painting of the playing cards. Very interesting
M7: And I found a clue.
FG: And you found a clue Yes you did. (?) didn't you?
IN: Anything in the Dining Room?
FG: I just found it interesting.
M7: (?)

Do you recall speaking to one another whilst you were in the rooms? If yes, can you recall what you spoke about?

FG: We talked about the quiz and the butterfly.

8.4 Accompanying DVD material

8.4.1 Museum Detective Notebook template

8.4.2 Museum Detective Notebook analysis

8.4.3 Example of a completed Museum Detective Notebook

8.4.4 Prototype implementation – documentation film

8.4.5 Prototype components

- Arduino programmes
- Soundscapes
- Ghostly Butterfly animation

8.4.6 Analysis of initial and final observations – spreadsheet

8.5 COMPARATIVE TABLES OF DATA GATHERED IN DINING AND DRAWING ROOM

Drawing room: Average time spent	Absolute values in minutes			Percentage of time spent in room	
	Before	After	Change	Before	After
in the room	02:24	03:23	40,6%	100%	100%
communicating around exhibition elements	01:27	02:02	39,5%	60%	60%
looking at objects in vitrines	00:20	00:47	136,1%	14%	23%

Dining room: Average time spent	Absolute values in minutes			Percentage of time spent in room	
	Before	After	Change	Before	After
in the room	02:41	03:22	25.8%	100%	100%
communicating around exhibition elements	01:27	02:06	45.1%	54%	62%
looking at objects in vitrines	00:18.4	00:16.6	-10.1%	11%	8%

Verbal interaction in the Drawing Room	Numbers of adults who			Percentage of adult visitors	
	Before	After	Change	Before	After
Ask questions	7	38	31	14%	52%
State facts	34	53	19	67%	73%
Express emotions	13	39	26	25%	53%
Recall experiences and memories	12	1	-11	24%	1%
Express ideas	4	10	6	8%	14%
Make associations	1	6	5	2%	8%
Other	3	7	4	6%	10%

Verbal interaction in the Drawing Room	Numbers of children who			Percentage of child visitors	
	Before	After	Change	Before	After
Ask questions	19	35	16	36%	56%
State facts	16	35	19	30%	56%
Express emotions	14	43	29	26%	68%
Recall experiences and memories	6	4	-2	11%	6%
Express ideas	2	14	12	4%	22%
Make associations	3	10	7	6%	16%
Other	1	4	3	2%	6%

Verbal interaction in the Dining Room	Numbers of adults who			Percentage of adult visitors	
	Before	After	Change	Before	After
Ask questions	10	45	35	18%	62%
State facts	37	52	15	65%	71%
Express emotions	15	37	22	26%	51%
Recall experiences and memories	4	3	-1	7%	4%
Express ideas	0	7	7	0%	10%
Make associations	5	8	3	9%	11%
Other	4	9	5	7%	12%

Verbal interaction in the Dining Room	Numbers of children who			Percentage of child visitors	
	Before	After	Change	Before	After
Ask questions	16	48	32	27%	70%
State facts	19	40	21	32%	58%
Express emotions	13	46	33	22%	67%
Recall experiences and memories	3	5	2	5%	7%
Express ideas	1	15	14	2%	22%
Make associations	1	13	12	2%	19%
Other	0	5	5	0%	7%

Non-Verbal interaction in the Drawing Room	Numbers of adults who			Percentage of adult visitors	
	Before	After	Change	Before	After
Bring to objects	23	33	10	45%	45%
Point things	24	34	10	47%	47%
Smile	16	60	44	31%	82%
Other	0	0	0	0%	0%

Non-Verbal interaction in the Drawing Room	Numbers of children who			Percentage of child visitors	
	Before	After	Change	Before	After
Bring to objects	15	39	24	28%	62%
Point things	18	47	29	34%	75%
Smile	13	57	44	25%	90%
Other	0	1	1	0%	2%

Non-Verbal interaction in the Dining Room	Numbers of adults who			Percentage of adult visitors	
	Before	After	Change	Before	After
Bring to objects	13	25	12	23%	34%
Point things	12	41	29	21%	56%
Smile	9	63	54	16%	86%
Other	0	1	1	0%	1%

Non-Verbal interaction in the Dining Room	Numbers of children who			Percentage of child visitors	
	Before	After	Change	Before	After
Bring to objects	16	22	6	27%	32%
Point things	12	39	27	20%	57%
Smile	7	60	53	12%	87%
Other	0	3	3	0%	4%